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50
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21 FIRST-HAND F-14 ACCOUNTS INSIDE

F-14 action from around the globe

Tomcat: the MiG master

Locking on to Concorde

F-14 TOMCAT
20
9 781913 295479

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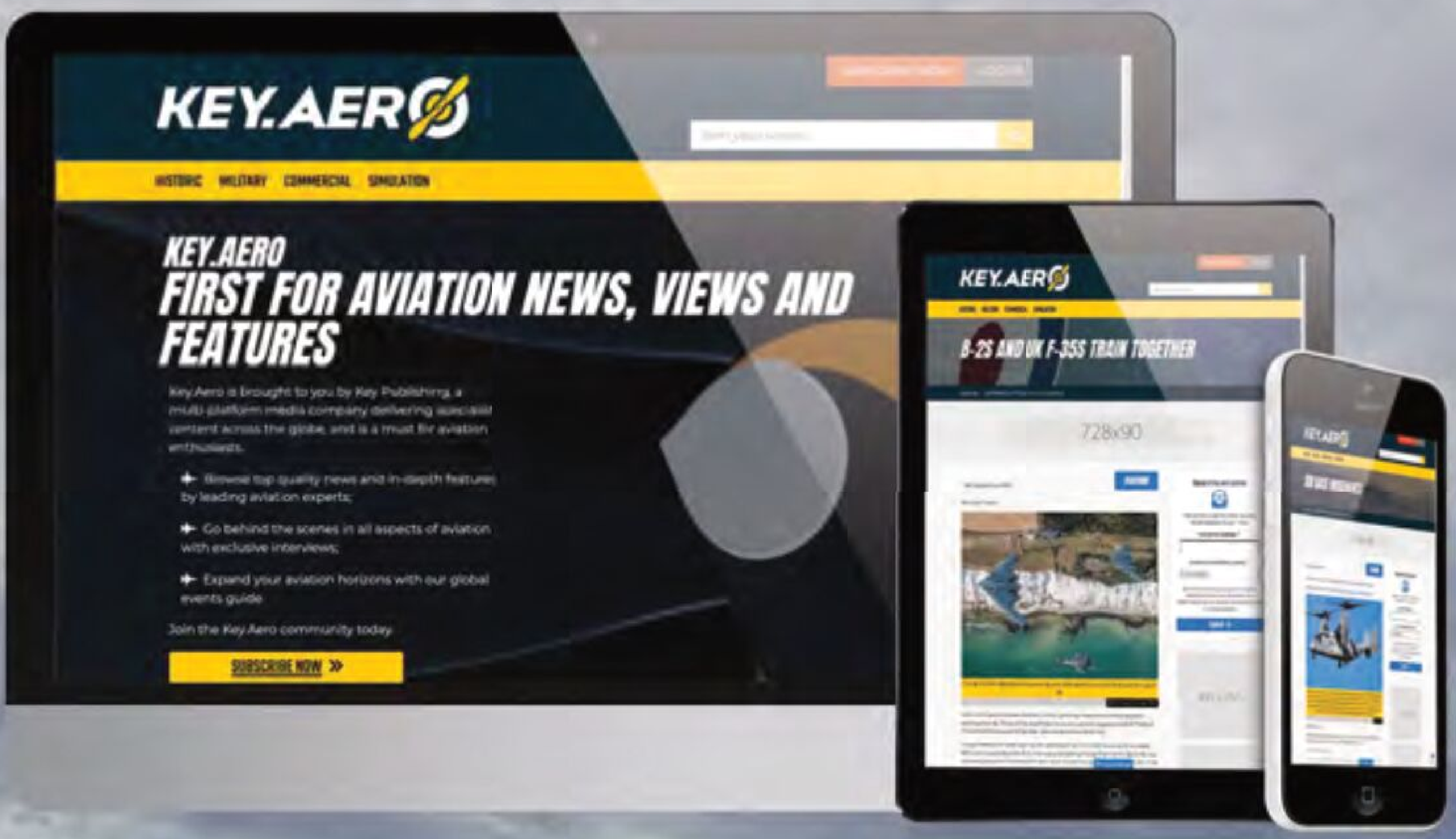
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Dan Stijovich

F-14 Tomcat: Tales from the cockpit

Vice Admiral Thomas Connolly was a wise man. Serving as Deputy Chief of Naval Operations for Air Warfare between November 1, 1966 and his retirement on August 1, 1971, Connolly was an advocate of Grumman's F-14 Tomcat, and a detractor of the General Dynamics-Grumman F-111B.

Giving testimony before the Senate Armed Services Committee (SASC) on March 9, 1968, SASC chairman, Senator John C Stennis D-Miss asked Connolly for his opinion on the F-111B and its suitability to Naval operations. Speaking from the heart, Connolly said: "There isn't enough power in all Christendom to make that airplane what we want!" Previously Connolly had provided his boss, Secretary of the Navy, Paul Ignatius with a memo supporting the F-111B. Ignatius reminded Connolly of that support, and Connolly stood corrected at the hearing.

Away from the political theatre, Connolly, an experienced Naval aviator who flew the F-111B knew it was sub-standard. Connolly's comment was a deathblow to the F-111B programme. It was cancelled two months later. Development of the Grumman F-14 Tomcat then went ahead. Connolly and his boss, Chief of Naval Operations, Admiral Thomas Moorer, were instrumental in the development of Grumman's F-14 and inspired the aircraft's Tomcat name.

Connolly and Moorer held the needs of the fleet in the forefront of their minds when selecting the Grumman super fighter. What a vision they had. Until such time that the Navy fields a new carrier-borne fighter, the F-14 Tomcat will remain the most capable. No Naval fighter since has the capability to fly as fast, as far from the carrier, with such a heavy weapon payload as the Tomcat. Not the Boeing F/A-18 Super Hornet, not the Lockheed Martin F-35C Lightning II, despite the advanced, complex, and in the case of the F-35C, stealthy credentials.

Take a look at the images used in this publication and appreciate the grace of the Tomcat. Grumman's designers must be congratulated for their work in making the Tomcat such a good looking aircraft, from every angle and in each configuration. And they did so in addition to giving the aircraft such fearsome capabilities. It launched from aircraft carriers in the worst weather conditions. It flew hundreds of miles from the ship. It carried AIM-54 Phoenix missiles with 100-plus mile range. It confronted Soviet bombers in the north Atlantic and the north Pacific during the Cold War. It became a precision-strike aircraft. It saw combat in Afghanistan and Iraq. It was improved and improved again. Finally, it retired in September 2006.

At the height of its Navy fleet service, there were 30 F-14 Tomcat squadrons in operation, two dedicated to training, 24 active-duty, and four with the Naval Reserve.

Not without its problems, the Tomcat was respected by opponents, allied or adversary. When adversary pilots electronically detected a Tomcat's AWG-9 radar nearby, many thought twice about engaging through fear of the AIM-54 missile. The Tomcat-Phoenix combo was a deterrent in itself.

That's not to mention the aircrews and maintainers. They were a creed of their own. Aircrew flying in all weathers, in combat and then landing on the flight deck after a long mission, and maintainers working all hours in the hangar deck to ensure their squadron's fleet of Tomcats stayed mission ready. Maintainers and aircrew alike had two motivations: operating the Tomcat and being part of the Navy fighter community.

As one pilot put it, "we were the biggest, baddest boys in town, we wanted to enter a fight, and no one stopped us."

On the eve of its 50th anniversary, long retired from Navy service, admiration for the F-14 remains. 'Anytime Baby'.

Mark Ayton
Author and editor

US National Archive/US Navy

Contents

06 **F-14 Overview**
Author and editor Mark Ayton provides details of the F-14 Tomcat fighter from official manuals.

12 **Illustrator**
An account of a Grumman technical illustrator working at the F-14 production facility at Calverton, Long Island, New York.

14 **Tomcat Pioneer**
Rick Gildea was an F-4 Phantom radar intercept officer who learned to fly the F-14, test its weapons, and went on to organise a big fleet missile shoot.

20 **The Art of Persuasion**
Snort Snodgrass racked up over 4,800 hours and 1,200 plus arrested landings in the F-14 Tomcat. He's often described as the real 'top gun'.

US National Archive/US Navy

US National Archive/US Navy/Lt Gozzo

26 **Fox Two**
A young radar intercept officer flying a combat air patrol with three squadron mates made world headlines in August 1981. This is their story.

30 **Tomcatter**
How a young man from rural Maine forged a 30-year Navy career from RIO to F-14 Program Manager.

34 **Best of the Best**
One story of a nugget RIO's Navy flying career which led to attendance at the TOPGUN school and a follow-on tour as an instructor.

38 **MiG Chaser**
As an F-14 pilot Kevin Sullivan chased North Korean MiG-21s, served as a TOPGUN instructor and then flew Mirage IIIs with the RAAF.

US National Archive/US Navy/ PH3 Nathanial Bryant

42 Test Pilot
Attending the Naval Test Pilot School has kudos, and many pilots graduate and serve with Naval Air Systems Command. Few go on to become astronauts.

44 Slugger and a Knight
From nugget RIO on F-4 Phantoms to commander of Carrier Air Wing 17, this story proves the service life of an F-14 Tomcat RIO was a busy one.

48 Jolly Roger
A tale of three types; a pilot who qualified to fly the A-6 Intruder, the F-14 Tomcat, and the F/A-18 Hornet.

52 Mike the Mechanic
Tales of maintaining F-14 Tomcats on land and sea from an F-14 plane captain.

56 Missile Man
Weapons evaluation, tactical doctrine, reconnaissance and operating the Tomcat in Japan, all aspects of one pilot's career.

58 Long-range Reconnaissance
Drive and determination got one young pilot into the Marine Corps, out of the Marine Corps and finally into Tomcats.

64 TARPS Specialist
A tale of a young aviator who followed in his father's footsteps to become an F-14 RIO and an air wing operations officer.

68 The Interceptor
In 1985, four Tomcats launched from the USS *Saratoga* to intercept a civil Boeing 737. They made the headlines.

72 Hi Roller
Some people have to switch life goals through no fault of their own. This is a tale of one individual that did just that.

US National Archive/US Navy/PH2 Charles W. Moore

US National Archive/US Navy/ PH2 Charles Moore

78 A Disciple
Throughout the 1980s, US Naval Reserve operated four F-14 Tomcat squadrons. Two were based at Miramar.

82 Lessons from a Legend
Some Navy aircrew are fortunate to be in the right place at the right time. Sometimes however, things do not fall right on a mission.

86 Confronter
With more than 1,000 hours on F-4 Phantoms, this aviator chose to transition to the Tomcat rather than the brand-new Hornet. He chose well.

90 Yacht Gunner
Serving two tours in probably the Navy's most famous fighter squadron was reward for a good job done in flight school by one budding aviator.

94 Shooter
A master jet base, aircraft carriers and the Tomcat production facility were all workplaces for one eager new Naval Flight Officer.

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In Detail: The Legendary Tomcat

Mark Ayton provides details of the F-14 Tomcat fighter as published in the official Naval Air Training and Operating Procedures Standardization manuals.

Grumman Aerospace Corporation designed and manufactured hundreds of Tomcats between 1969 and 1991. Their main customer was the United States Navy, while its only export customer was the Imperial Iranian Air Force. Iran's operation of the F-14 is outside the coverage of this publication, but United States Navy Tomcat operations commenced in 1974 and finished at the type's retirement on September 22, 2006. Thirty-two years of service, worldwide deployments, and countless encounters with potential adversary aircraft, the supersonic, two-seat, twin-engine, swing-wing F-14 Tomcat was an all-out air-superiority fighter.

In addition to its primary fighter role, carrying AIM-7 Sparrow and/or AIM-9 Sidewinder air-to-air missiles and an internal 20mm gun, the aircraft was designed for fleet air defence employing the AIM-54 Phoenix long-range missile and ground attack (general purpose and precision ordnance) missions. Armament and peculiar auxiliaries used only during secondary missions are installed in low-drag, external configurations. Mission versatility and tactical flexibility were enhanced through independent operational capability or integration under existing tactical data systems.

The forward fuselage, containing the flight crew and electronic equipment, projects forward from mid-fuselage and wing glove. Outboard pivots in the highly swept wing glove support the movable wing panels, which incorporate integral fuel cells and full-span leading-edge slats and trailing-edge flaps for supplemental lift control. In flight, the wings may be varied in sweep, area, camber, and aspect ratio by selection of any leading-edge sweep angle between 20° and 68°. Wing sweep can be automatically or manually controlled to optimize performance and thereby enhance aircraft versatility. Separate variable-geometry air inlets, offset from the fuselage in the glove, direct primary airflow to two turbofan engines equipped with afterburners for thrust augmentation. The displaced engine nacelles extend rearward to the tail section, supporting the twin vertical tails, horizontal tails, and ventral fins. The middle and aft fuselage, which contains the main fuel cells, tapers off in depth to the rear where it accommodates the speed brake surfaces and arresting hook. All control surfaces are positioned by irreversible hydraulic actuators to provide desired control effectiveness throughout the flight envelope. Stability augmentation features in the flight control system enhance flight characteristics and thereby provide a more stable and manoeuvrable weapons delivery platform. The tricycle-type, forward-retracting landing gear is designed for nose gear catapult launch and carrier landings. Missiles and external stores are carried from eight hard point stations on the centre fuselage between the nacelles and under the nacelles and wing glove; no stores are carried on the movable portion of the wing. The fuel system incorporates both in-flight and single-point ground refuelling capabilities

A specially painted F-14D Tomcat assigned to Fighter Squadron 213 (VF-213) 'Blacklions' on a mission over the Persian Gulf. The aircraft is loaded with an AAQ-14 LANTIRN targeting pod and a GBU-16 1,000lb bomb.
US National Archives/ US Navy

Cockpit

The aircraft accommodates a pilot and RIO [radar intercept officer] in a tandem seating arrangement. To maximize the external field of view, stations within the tandem cockpit are prominently located atop the forward fuselage and enclosed by a single clamshell canopy. Integral boarding provisions to the cockpit and aircraft top deck are on the left side of the fuselage. Each crew station incorporates a rocket ejection seat that is vertically adjustable. A single environmental control system provides conditioned air to the cockpit and electronic bays for pressurization and air-conditioning. Oxygen for breathing is supplied to the crew under pressure from an on-board oxygen generating system with stored gaseous oxygen as backup. The cockpit arrangement provides minimum duplication of control capability, thereby necessitating two aircrew for safe flight.

Pilot Cockpit

The forward station of the cockpit is arranged and equipped for the pilot. In addition to three electronic displays for viewing tactical, flight, navigational, and electronic countermeasures data, the pilot instrument panel also contains armament controls, flight, and engine instruments. Engine controls, fuel management, auxiliary devices, autopilot, and communication control panels are on the left console. Display, power, lighting, and environmental controls are on the right.

RIO Cockpit

The aft station of the cockpit is equipped for the RIO. This instrument panel contains controls and three electronic displays for the radar, tactical, and navigational flight instruments. Armament controls, sensor controls, and communication panels are on the left console. The right console contains a navigational display, data entry unit, electronic countermeasure controls, data-link controls, lighting controls, and the IFF panel.

Control and Display System

The control and display system provides the crew with navigation, aircraft status, and flight tactical information.

All variants of the F-14 were equipped with Programmable Tactical Information Displays (PTIDs) a pre-requisite system requirement for AAQ-14 LANTIRN targeting pod configuration.

The PTID is also known as the Programmable Multi-Display Indicator Group (PMDIG). This type of display provides programmable push-buttons used on the F-14B and F-14D to control switching of various tactical processors attached to the MIL-STD-1553B data bus. The PTID improved display readability, brightness, and resolution. The PTID replaced the F-14's original TID Tactical Information Display (TID).

Grumman's final variant, the F-14D, uses two display processors (DP1 and DP2) and three multifunction displays (pilot centre MFD1, pilot right MFD2, and RIO MFD3), also known as MDIGs (Multi-Display Indicator Group). Each display has programmable processor and associated display heads. One MDIG provides pilot display capability via a combined vertical situation display and a heads-up display (HUD). The other MDIGs provide the pilot and RIO with a head-down display capability.

Other displays fitted to the F-14D are a HUD system (see below), a cockpit television sensor, a HUD-video panel, a pilot displays control panel, and a multi-status indicator.

The control and display system also sends display information to the digital display, the radio frequency indicator, radio frequency/control indicator, and the mission video recorder.

The data entry unit is a remote terminal that communicates with the mission computers via the multiplex bus.

F-14 Tomcat Characteristics

	F-14A	F-14B	F-14D
Wingspan un-swept	64ft 1.5in	64ft 1.5in	64ft 1.5in
Wingspan swept	38ft 2.5in	38ft 2.5in	38ft 2.5in
Length	62ft 8in	62ft 8in	62ft 8in
Height	16ft	16ft	16ft
Wing area	565ft^2	565ft^2	565ft^2
Empty weight including trapped fuel, oil, gun, and pylons	42,000lb	43,600lb	43,750lb
Internal fuel load	16,200lb	16,200lb	16,200lb
External fuel load	3,800lb	3,800lb	3,800lb
Max weapons payload	14,500lb	14,500lb	14,500lb
Max take-off weight	72,000lb	74,350lb	74,350lb
Engines	Two P&W TF30-P-414A each rated at 20,100lb with AB at sea level	Two GE F110-GE-400 each rated at 23,400lb with AB at sea level	Two GE F110-GE-400 each rated at 23,400lb with AB at sea level
Max speed	Mach 2.38	Mach 2.38	Mach 2.38
Ceiling	50,000ft plus	53,000ft plus	53,000ft plus
Combat range	500nm	500nm	500nm

Heads-Up Display (F-14D)

The Heads-Up Display (HUD) provides a combination of real-world cues and flight direction symbols, projected directly on a combining glass assembly. The flight information on an optical combiner is projected in the pilot's forward field of view. The display is focused on infinity, thereby creating the illusion that the symbols are superimposed on the real world (and so that visual cues received from outside the aircraft are not obscured). The pilot usually steers based on interpretation of the visually observed real world. The HUD can be selected to be the primary flight reference for all flight regimes displaying navigation and weapon delivery information.

Canopy System

The cockpit is enclosed by a one-piece, clamshell, rear-hinged canopy. Provisions are included to protect the pilot and RIO from lightning strikes by the installation of aluminium tape on the canopy above the heads of the crew. Normal opening and closing of the canopy are by a pneumatic and hydraulic actuator with a separate pneumatic actuator for locking and unlocking. The canopy can be opened to approximately 25° for ingress and egress in approximately eight to ten seconds. In emergencies, the canopy can be jettisoned from either crew position or externally from either side of the forward fuselage.

Ejection System

F-14A and F-14B aircraft use the MK GRU-7A ejection seat.

The F-14D is equipped with an automatic electronically sequenced command escape system incorporating two rocket-assisted Navy Aircrew Common Ejection Seats (NACES) designated the SJU-17(V)3/A (pilot) and SJU-17(V)4/A (RIO).

Both seats are identical in operation and differ only in nozzle direction of their lateral thrust motors, which provide a divergent ejection trajectory away from the aircraft path. When either crewmember initiates the command escape system, the canopy is jettisoned with ballistic force and each crewmember is ejected in a pre-set time sequence. The RIO is ejected to the left and the pilot to the right.

Safe escape is provided for most combinations of aircraft altitude, speed, attitude, and flightpath within an envelope from zero airspeed, zero altitude in a substantially level attitude to a maximum speed of 600 KCAS between zero altitude and 50,000 feet.

Air Inlet Control System

The purpose of the Air Inlet Control System (AICS) is to decelerate supersonic air and to provide even, subsonic airflow to the engine throughout the aircraft flight envelope. The AICS consists of two variable-geometry intakes, one on each side of the fuselage at the intersection of the wing glove and fuselage. Intake inlet geometry is varied by three automatically controlled hinged ramps on the upper side of the intakes. The ramps are positioned to decelerate supersonic air by creating a compression field outside the inlet and to regulate the amount and quality of air going to the engine. The rectangular intakes are separated from the fuselage to minimize boundary layer ingestion and are highly raked to optimize operation at high angle of attack.

Inlet ramps are positioned by electrohydraulic actuators that respond to fixed schedules in the AICS programmers. Separate programmers, probes, sensors, actuators, and hydraulic power systems provide completely independent operation of the left and right air inlet control systems.

Electrical power for the AICS programmers is provided by the AC and DC essential No.2 buses. The ramp stow function is powered by the dc essential No.1 bus. Hydraulic power is supplied individually to the left AICS from the combined hydraulic system and to the right AICS from the flight hydraulic system. The left AICS programmer also functions as a wing-sweep backup computer.

TF30 Engine (F-14A)

The two TF30-P-414 engines which power the F-14A are a mixed-flow, dual spool afterburning low-bypass turbofan design manufactured by Pratt and Whitney Aircraft of West Palm Beach, Florida. The engine incorporates a nine-stage low pressure compressor including a three-stage fan driven by a three-stage low pressure turbine; and a seven-stage axial flow high-pressure compressor driven by a single-stage high-pressure turbine. The combustor is a through flow annular type. The variable-area exhaust nozzle is hydraulically actuated. The engine-mounted accessory gearbox provides the necessary extracted power needed to drive the accessories. The engine control system regulates speeds, temperature levels and fuel flow for afterburning and non-afterburning operation.

Variable Exhaust Nozzle

Engine exhaust gases at higher thrust settings are discharged through the nozzle throat at sonic velocity and are accelerated to supersonic velocity by the controlled expansion of the gases. Varying nozzle throat area controls fan stall margin, which optimizes performance.

The variable exhaust nozzle is a three-flap, convergent- divergent-type nozzle. Nozzle variation is accomplished by axial movement of four hydraulic actuators mechanically synchronized for geometric stability. These hydraulic actuators use oil from a separate compartment in the engine oil storage tank and are operated by a hydraulic pump that responds to augmenter fan temperature control signals. A failed open nozzle may be caused by an oil leak, but if the leak is in the nozzle system, only a portion of the main engine lube oil will be lost. During basic engine operation, the nozzle area is modulated to a near-closed position, and, in afterburner, the nozzle area is infinitely variable to a full-open position. The nozzle will go full open airborne with the throttle at idle at low altitude and airspeeds. A gauge for each engine on the pilot instrument panel next to the engine instruments indicates nozzle position in percentage from 0 to 100. Normal indication for maximum afterburner is approximately 70%.

F110 Engine (F-14B and F-14D)

The F-14B and F-14D types are powered by two F110-GE-400 turbofan engines designed and manufactured by GE Aviation of Cincinnati, Ohio. They are dual-rotor engines consisting of a three-stage fan driven by a two-stage, low-pressure turbine and a mechanically independent, aerodynamically balanced, nine-stage, high-pressure compressor driven by a single-stage, air-cooled high-pressure turbine. Engine operation is automatically regulated and maintained electrically by the augmenter fan temperature control unit and by throttle inputs to the main engine control.

Each engine is slung in a nacelle with the thrust axis laterally offset approximately 4ft 6in from the aircraft centreline. The installed static engine thrust at military power is 13,800lb and, at maximum afterburner power, thrust is 23,600lb. Installed engine thrust at maximum afterburner at Mach 0.9 at sea level is 30,200lb. Acceleration time from idle to military power is approximately four seconds.

During operation, air entering the engine is directed into the fan, which initially compresses the air and directs its flow into the engine core compressor and fan bypass duct. Direction of airflow into the fan is optimized by variable-geometry inlet guide vanes (IGV) and into the compressor by variable geometry stator vanes. The high-pressure compressor further compresses the air through the nine-stage compressor before discharging it into the annular combustion chamber to mix with fuel from the fuel nozzles. This fuel-air mixture is initially ignited by the main spark igniter in the combustion chamber. As a result of this combustion, expanding gases drive the high- and low-pressure turbines. Power to drive the two accessory gearboxes is obtained from the high-pressure rotor.

From the turbine section, the exhaust gases pass into the afterburner section and are mixed with air from the fan bypass duct. During afterburner operation, fuel is sprayed into this mixed airflow and ignited for additional thrust.

The engine is controlled by three units: the hydro mechanical main engine control, the electronic augmenter fan temperature control, and the afterburner fuel control. There are two modes of operation: primary (electronic) and secondary (mechanical), with provisions for automatic and manual switchover to secondary.

Afterburner Ignition

The afterburner ignition ignites afterburner fuel flow for afterburner light-offs and relights (in the event of an afterburner blowout). The afterburner ignition is powered by the same winding in the engine-driven alternator that powers the main energy ignition. The augmenter fan temperature control provides logic to control afterburner ignition automatically and prevents simultaneous powering of the main high-energy and afterburner ignitions. In the event of an afterburner blowout, relight is normally provided within 1.5 seconds.

Fatigue Engine Monitoring System

The Fatigue Engine Monitoring System (FEMS) is a solid-state electronic system that provides data acquisition, processing, and storage. FEMS information is displayed on the multi-function displays. The system accumulates airframe stress and fatigue data and relevant engine performance data, both in flight and on deck, from the engine monitoring system processors. Engine faults are isolated to the appropriate Weapon Replaceable Assembly (WRA) or combinations of WRAs and recorded for later transfer to the Data Processing Ground Station (DGPS) for diagnostic analysis, troubleshooting, and appropriate maintenance. The DPGS also computes and stores engine parts life tracking and failure-trending data.

A F-14 Tomcat assigned to Fighter Squadron 103 (VF-103) 'Jolly Rogers' makes a high-speed fly-by near USS *Nimitz*. Moisture in the air around the aircraft condenses into water vapour, as the aircraft breaks the sound barrier.
US National Archives/US Navy

Wing-Sweep System

The variable geometry of the wing-sweep system provides the pilot with considerable latitude for controlling wing lift and drag characteristics to optimize aircraft performance over a broad flight spectrum.

Under normal operating conditions, the wings are automatically positioned to the optimum sweep angle for maximum manoeuvring performance. The pilot can selectively position the wings at sweep angles aft of optimum.

A mechanical backup control system is provided for emergency and over sweep operations.

The outboard location of the wing pivot reduces the change in longitudinal stability as a function of wing-sweep angle. Two independently powered, hydro-mechanical screw jack actuators, mechanically interconnected for synchronization, position the wings in response to pilot or Central Air Data Computer commands. In flight, the wings can be positioned between 20° and 68° wing sweep angle. On the deck, the range is extended aft to 75° (over sweep position) to reduce the span for parking. Such authority results in a variation of wing span from approximately 64ft to 33ft.

Cavities above the engine nacelles and the mid-fuselage accommodate the inboard portions of the wing panels as they sweep aft. Sealing of the underside is by a wiper seal and airbag. The bag is pressurized by engine bleed air. Airbag pressure is released during over sweep to avoid overloading of the flap mechanism. An over wing fairing encloses the wing cavity and provides a contoured seal along the upper surface of the wing for the normal range of in-flight sweep angles. The left and right over wing fairing actuators are pressurized by the combined and flight hydraulic systems, respectively.

Flaps and Slats

The flaps and slats form the high-lift system, which provides the aircraft with augmented lift during the two modes of operation: take-off or landing, and manoeuvring flight. The flaps are of the single-slotted type, sectioned into three panels on each wing. The two outboard sections are the main flaps utilized during both modes of operation. The inboard section (auxiliary flap) is commanded only during take-off or landing. The slats consist of two sections per wing mechanically linked to the main flaps.

Main Flaps

The main flaps on each wing consist of two sections simultaneously driven by four mechanical actuators geared to a common flap driveshaft. Each wing incorporates a flap asymmetry sensor and flap over travel switches for both the extension and retraction cycles.

Cove doors, spoilers, eyebrow doors, and gusses operate with the flaps to form a slot to optimize airflow over the deflected flap. The cove doors are secondary surfaces along the underside of the wing forward of the flap. As the flaps pass 25° deflection, a negative command received from the DFCS depresses the spoilers to minus 4.5° to meet with the cove doors. Because the spoilers do not span the entire wing as do the flaps, gusses inboard and outboard of the spoilers perform the flaps-down function of the spoilers. With the flaps retracted, the eyebrow doors, which are the forward upper surface of the flaps, are spring-loaded in the up position to close the gap between the trailing edge of the spoiler or guss and the leading edge of the flaps. Mechanical linkage retracts the eyebrow door when the flaps are lowered to provide a smooth contour over the upper surface of the deflected flap.

Auxiliary Flaps

The auxiliary flaps are inboard of the main flaps and are powered by the combined hydraulic system. The actuator is designed to mechanically lock the auxiliary flaps when in the up position. In the event of high dynamic pressure conditions, a bypass valve within each control valve opens causing the auxiliary flap to be blown back, thus avoiding possible structural damage. During loss of electrical power, the control valve is spring-loaded to retract, retracting the auxiliary flaps within one minute. The auxiliary flaps use cove doors, eyebrow doors, and gusses identical in purpose and operation with those associated with the main flaps.

Slats

The slats on each wing are divided into two sections, both of which are driven simultaneously by a single-slat driveshaft. The slats are supported and guided by seven curved tracks.

Speed Brakes

The speed brakes consist of three individual surfaces, one upper and two lower panels on the aft fuselage between the engine nacelles. The speed brakes may be infinitely modulated on the extension and retraction cycle. Operating time for full deflection is approximately two seconds. Hydraulic power is supplied by the combined hydraulic system, and electrical power is through the essential No.2 DC bus.

Flight Control Systems

Flight control is achieved through an irreversible, hydraulic power system operated by a control stick and rudder pedals. Aircraft pitch is controlled by symmetrical deflection of the horizontal stabilizers. Roll control is effected by differential stabilizer deflections and augmented by spoilers at wing-sweep positions less than 62°. Directional control is provided by dual rudders. During power approach manoeuvres, the aircraft flightpath can be controlled through symmetric spoiler displacement by the pilot selecting direct lift control.

The horizontal stabilizer and rudders are powered by the flight and combined hydraulic systems and controlled by pushrods and bell cranks. A third independent flight control hydraulic power source is provided by the backup module. Spoiler control is effected by an electrohydraulic, fly-by-wire system and powered by the combined hydraulic system (inboard spoilers) and outboard spoiler module (outboard spoilers).

The DFCS includes a stability augmentation system, an autopilot and auxiliary control functions for spoiler control, rudder authority control, lateral stick authority control, and Mach trim compensation.

Digital Flight Control System (All models)

The DFCS augments the aircraft's natural damping characteristics and provides automatic commands for control of attitude, altitude, heading, and approach modes selected by the pilot. All DFCS functions are integrated into the primary flight control system.

The DFCS also provides an Up and Away Automatic Rudder Interconnect (UA-ARI) to enhance departure resistance, spin recovery and high angle-of-attack flying qualities, and a Power Approach Automatic Rudder Interconnect (PA-ARI) to enhance the landing approach flying qualities. The DFCS consists of three computers, one computer for each axis (pitch, roll, and yaw). Each computer has two distinct and independent processors called channels or segregations (one 'A' and one 'B' channel per axis), each controlling one of the dual series servo actuators. All channels share data through cross channel data links.

Automatic Carrier Landing

The DFCS incorporates ACLS software with control laws providing a vertical rate (h-dot) command system with integrated direct lift control (DLC). These control laws provide corrections for glide path deviations commanded directly by horizontal stabilizer and DLC through altitude rate h-dot feedback. Since the F-14 DFCS does not have a direct altitude rate input from the IMU/INS, the DFCS has incorporated the normal accelerometer sensor to derive a pseudo vertical rate feedback signal by sensing motion in the vertical axis. This normal accelerometer is the same sensor used in the auto-throttle approach power compensator system and the autopilot altitude hold mode.

ACLS control of the aircraft is achieved through the autopilot by pitch parallel servo actuator and DLC commands in pitch and spoiler commands in roll. The pitch parallel actuator is utilized to command the control stick and horizontal stabilizers to provide a large amplitude, low frequency control response. The integrated blended DLC is utilized to provide a small amplitude, high frequency control response. This system is significantly more capable than previous versions of compensating for varying engine response, winds, and/or deck motion. The DFCS continues to provide roll control through the spoilers only and does not capitalize on the full benefits of the automatic rudder interconnect. The lateral axis is the primary limitation of the F-14 DFCS ACLS and must be closely monitored by aircrew for any unacceptable course deviations during the approach.

Landing Gear Systems

The aircraft has fully retractable, tricycle landing gear operated by combined hydraulic pressure in the normal mode of operation and a stored source of pressurized nitrogen for emergency extension. The landing gear retract forward so that air loads and gravity assist on emergency extension. Air-oil shock struts with oil metering pins reduce landing loads transmitted to the airframe, and the struts are fully extended with the gear in the wells. All landing gear doors remain open with the gear extended. Design limit landing sink speed for the aircraft is 1,520ft per minute (nominal landing sink speed is about 650ft per minute).

Nose Landing Gear

The dual-wheel nose landing gear has a shock strut consisting of an outer cylinder and a lower internal piston that has a maximum stroke of 18in. During normal ground operations, the strut is fully extended. Pilot control is provided to kneel the strut (four inch stroke remaining) for catapult operations. During retraction, the fully extended nose strut is rotated forward by the retract actuator into the well and enclosed by two forward and two aft doors. The forward doors are operated by a separate actuator that also engages the gear up lock, whereas the two aft doors are mechanically linked to the shock strut. An up lock hook actuator engages a roller on the lower piston to hold the gear and doors in the retracted position. During extension, the telescoping drag-brace compresses so that a down lock actuator mechanically locks the inner and outer barrel to form a rigid member for transmission of loads to the airframe.

Nose Gear Catapult System

Catapult connection components on the nose landing gear shock strut piston provide nose gear catapult capability. A launch bar attached to the forward face of the nose gear steering collar guides the aircraft onto the catapult track and serves as the tow link that engages the catapult shuttle. A holdback fitting secures the holdback restraint prior to launch. The two-piston nose strut uses the stored energy catapult principle to impart a positive pitch rotation movement to the aircraft at shuttle release, thus providing for a hands-off launch fly-away technique.

Main Landing Gear

Each main landing gear shock strut consists of an upper outer cylinder and a lower internal piston, which has a maximum stroke of 25 inches. A hard step (31,000lb required for further compression) in the strut air curve provides a consistent four inch stroke remaining in the ground static condition. A side-brace link is mechanically extended from the inboard side of the strut outer cylinder to engage in a nacelle fitting and thus provides additional side load support for ground operations.

The path of the wheel assembly is controlled by the drag brace as it folds (jack-knifes upwards) during gear retraction and unfolds during extension. The fully extended shock strut and jack-knifed drag brace retracts forward and rotates the wheel assembly 90° to lie flat in the wheel well. Inboard, outboard, and aft main gear doors are individually actuated closed in sequence to provide fairing for the retracted gear. An up lock hook on the shock strut engages a roller in the wheel well to hold the gear in the retracted position. The main landing gear actuator on the inboard side of the shock strut retracts and extends the gear assembly.

The gear down lock actuator, mounted at the drag brace knee pin, extends to prevent unlocking (jack-knifing) of the drag brace. Hydraulic pressure must be supplied to the down lock actuator in order to retract it against the spring action of the integral locking mechanism. A paint stripe across the drag brace knee pin provides an external visual indication of the drag brace locked condition. A ground lock device clamps onto the down lock actuator rod for making the main gear safe.

Maximum strut extension and wheel alignment are controlled by torque arms that incorporate cam-operated micro switches to detect a weight-on-wheels condition (greater than five inches of strut compression). The single split-type wheel assembly incorporates thermal fuse blow plugs and a pressure relief device to prevent over inflation of the tyre.

Nose Strut Kneel

Prior to catapult hook-up, the nose strut is compressed 14in.

Selection of the kneel position toggle switch releases hydraulic fluid from the shock strut transfer cylinder to the combined hydraulic system return line, causing the weight of the aircraft to compress the shock strut 14in. Stroking of the nose strut causes the aircraft to rotate about the main wheels. The aircraft may be taxied or towed in the strut-kneeled position except for the nuisance trip of the launch bar at greater than 10° steering angle; this is the position used for taxiing onto the catapult and enhances accessibility to the forward fuselage compartments during ground maintenance. Since the nose strut is bottomed during the catapult launch stroke, the energy stored in the last four inches of strut-piston stroke is released upon shuttle release at the end of the catapult stroke to impart a nose-up pitching moment to rotate the aircraft to the fly-away attitude without any control required by the pilot. All the stored energy is expended before the nose wheels leave the deck edge.

Launch Bar

The launch bar is attached to the nose gear and serves as the tow link for catapulting the aircraft. With the nose strut extended, the launch bar is held in the retracted position. The launch bar can be lowered by kneeling the aircraft and turning the nose wheel greater than ±10° from the centred position. The launch bar can also be lowered by the deck crew with no pilot action after the aircraft has been kneeled.

Ears on the head of the launch bar engage under the lip of the catapult lead-in track and the head serves as a guide to steer the nose wheel on the catapult track and engage the shuttle. For an abort, the launch bar cannot be raised until the shuttle is disengaged.

Arresting Hook System

The arresting hook installation consists of a stinger tail hook and associated control mechanism mounted to the underside of the centre fuselage. The hook shank is free to pivot up and down at its attachment point. A pneumatic dashpot preloads the hook down to minimize hook bounce on contact with the deck. The hook shank is free to pivot left or right within a ± 26° sway angle with positive centring action provided by a pneumatic damper housed inside the tail hook shank. The trail angle of the arresting hook provides for hook point-deck contact even with the nose landing gear strut fully compressed.

Aircraft handlers direct a F-14D Tomcat assigned to Fighter Squadron 31 (VF-31) 'Tomcatters' into the launch position on the flight deck on board USS *Theodore Roosevelt* underway in the Persian Gulf.
US National Archives/US Navy

Illustrator

Before an F-14 even gets airborne, someone has to pull everything together behind the scenes. **Bill Barto** was one of the illustrators fortunate enough to work on the project.

An F-14A prototype on test flight in 1972. Grumman

BILL BARTO started working for the Grumman Aerospace Corporation in 1972, just as the F-14 Tomcat programme was picking up speed. Bill had applied to the company for the role of draughtsman working on the Space Shuttle programme. At the time Grumman was a contender for winning the space vehicle programme. That did not happen, but Grumman hired Bill to work in Plant 2 making components such as motor mounts, rudder pedals, and primarily arrester hooks for all five aircraft in production at the time: the A-6 Intruder, EA-6 Prowler, C-2 Greyhound, E-2 Hawkeye and the F-14 Tomcat.

Technical Publications

After 18 months of producing arrester hooks, Bill wanted a new work challenge. He read an internal ad seeking technical illustrators working for Grumman's technical publications department. Already qualified as a draughtsman, Bill met the criteria for illustrating aircraft manuals, got hired and spent ten years working on the F-14A flight manuals. He then spent a further ten years as Grumman's senior technical illustrator during which time he regularly helped run F-14 flight manual conferences at the two main Tomcat bases: Naval Air Station Miramar, California, and Naval Air Station Oceana, Virginia.

Despite his love of working as the senior technical illustrator, Bill was offered the opportunity to work as assistant historian in Grumman's History Centre, repository of the corporate archives.

After three years working as a company historian, Bill returned to the technical publications department to help produce the flight manuals for the F-14D.

Illustrating

Bill's job as a technical illustrator was an interesting one. His illustrations were based on blueprints, photographs of different components, and actually looking over a real aircraft, especially inside the cockpits.

Bill and all his colleagues illustrated everything autographically (hand drawn) including the tone quality of the instrument panels, and diametrically (in cross section). Grumman's illustrations are remarkable, despite looking like photographs, they are all artwork.

There were three volumes to the flight manual. An unclassified manual that explained the equipment, a confidential manual that focussed on the aft cockpit, and a tactics manual, the big red book which was classified. It explained how to fight an enemy aircraft, and the required positions for launching each type of missile.

In addition to the F-14 flight manuals, Bill's department also illustrated the equivalent manuals for maintenance, avionics and details of the landing gear wells and engine bays.

Calverton and the F-14

The F-14 Tomcat was designed in Bethpage, the original Grumman plant where its design departments were located. But the Tomcat was assembled at Calverton in the Long Island countryside. The facility was originally owned by the US Navy and became busy from the early 1950s as the flight test location for aircraft such the F9F Panther, F11 Tiger, E-2 Hawkeye, C-2 Greyhound, A-6 Intruder, EA-6 Prowler and of course the F-14 Tomcat.

Development and production of the F-14 came about as a result of the failure of the F-111B, the naval version of the F-111. Just seven F-111Bs were made. One, BuNo 151971, crashed at Calverton on September 11, 1968 with the tragic loss of two Grumman test pilots.

Originally configured with one seat and one tail, the F-111B was re-configured with two seats and two tails but was simply too big and too heavy to get on and off an aircraft carrier. The F-111B programme was cancelled.

Following an official competition with America's other aircraft companies of the day, the F-111B was eventually replaced by Grumman's F-14 Tomcat.

Twelve prototypes were produced, and test flown at Calverton, all but one painted with bright wingtips and tail stripes. Aircraft seven was the odd one out. It was painted white with a red stripe along its fuselage and used to test alternate types of engines for production series aircraft. Pratt & Whitney's TF30 was originally intended as an interim power plant for the Tomcat. Many years later, the General Electric F110 engine was selected for the F-14B and F-14D variants.

All Tomcat sub-assemblies were made in Bethpage and transported to Calverton for final assembly. All components, parts and sub-assemblies entered one end of Plant 6, the final assembly building, from where complete F-14 aircraft rolled out of the building's opposite end.

Forward and main fuselage structures were assembled at Bethpage and transported to Calverton's Plant 6. Moving from station to station, the fuselage structures had components, electrical, hydraulic and fuel lines installed, and wings, tail and stabilisers fitted.

Post roll-out, aircraft were moved to a booth for painting (originally grey over white, then chronologically overall grey, and finally tactical grey camouflage) and then to a huge, prefabricated hangar for drying. Plant 7 was the aircraft's next destination, the flight test facility where various final tests, such as avionics and pressure, were conducted before first flight.

The flight test facility at Calverton was quite an operation. Grumman company test pilots were always the first aircrew to fly each aircraft. Usually, a pilot, with either a second pilot or a Grumman flight engineer in the aft seat to work the radios and navigation systems. Test flights were conducted on a range over the Atlantic Ocean, clear from all commercial air traffic. Navy test pilots then performed a more robust functional check flight.

In the heyday of production output, the flight test department would regularly fly at weekends to meet the delivery schedule.

Programme Cancellation

Bill's second tenure working in the Grumman technical illustrations department was short-lived. The F-14D contract was cancelled by the US government in 1989, and Bill's near-20 years of Grumman employment came to an end. Bill was not alone; tens of thousands of jobs were lost in Grumman and its subcontractors.

But his time with the F-14 Tomcat was not done. In his retirement, Bill volunteers at the Cradle of Aviation Museum on Long Island, New York, home to the oldest serving Tomcat in the world, aircraft number 3. When visitors and guests tour the museum and look around the resident Tomcat, Bill often gets asked: "Is this the aeroplane that Tom Cruise made famous?" Taking a moment, Bill replies: "No, this is the aeroplane that made Tom Cruise famous!"

« Tomcat prototypes on the flight line outside Plant 7, the flight test facility at Calverton. Grumman

Tomcat Pioneer

How a former F-4 Phantom radar intercept officer learned to fly the F-14, test its weapons, and organise a big fleet missile shoot.

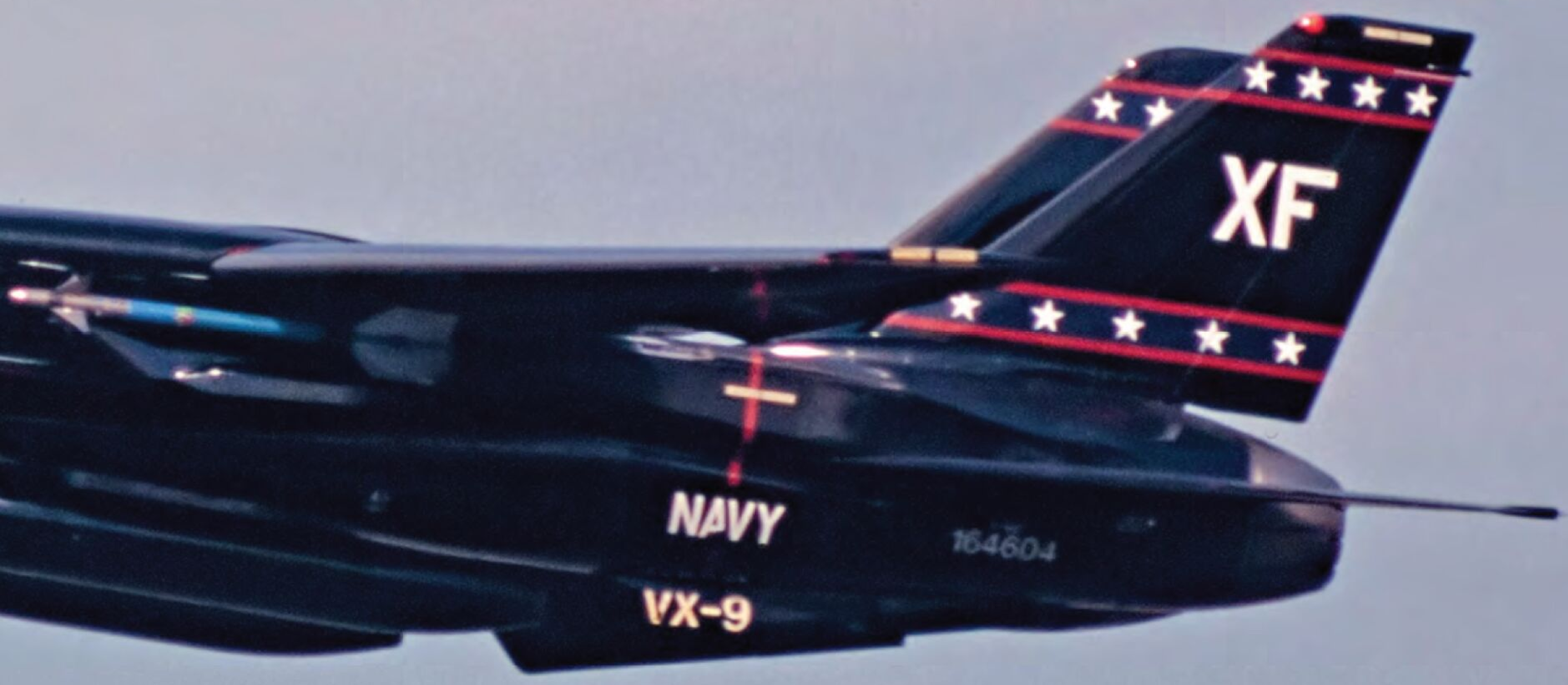
THE F-14 Tomcat was an aspirational aircraft for Rick Gildea. After serving two combat cruises to Vietnam in the F-4 Phantom, Rick wanted to fly Tomcats but was uncertain how to make that happen. He followed the advice of a squadron colleague who recommended he got a tour at a unit due to receive the mighty Tomcat. For Rick, that unit turned out to be the Naval Missile Center (NMC) based at Naval Air Station Point Mugu, California. When Rick arrived at Point Mugu, the NMC had had already conducted early testing of the AWG-9 weapon system installed in the forward fuselage of the TA-3B. NMC test pilots had flown the Skywarrior with flight test engineers on board who input changes to the AWG-9 system while airborne. These flights were undertaken in August and September 1971 before the AWG-9 was ever installed in an F-14.

Rick made his first F-14 flight at Point Mugu in 1973. By today's standards, Rick's experience back then was remarkable. He learned how to fly the jet by watching and working with aircrew who had already flown the jet, and engineers working for Grumman, the Hughes Aircraft Company, and the Naval Air Test Center.

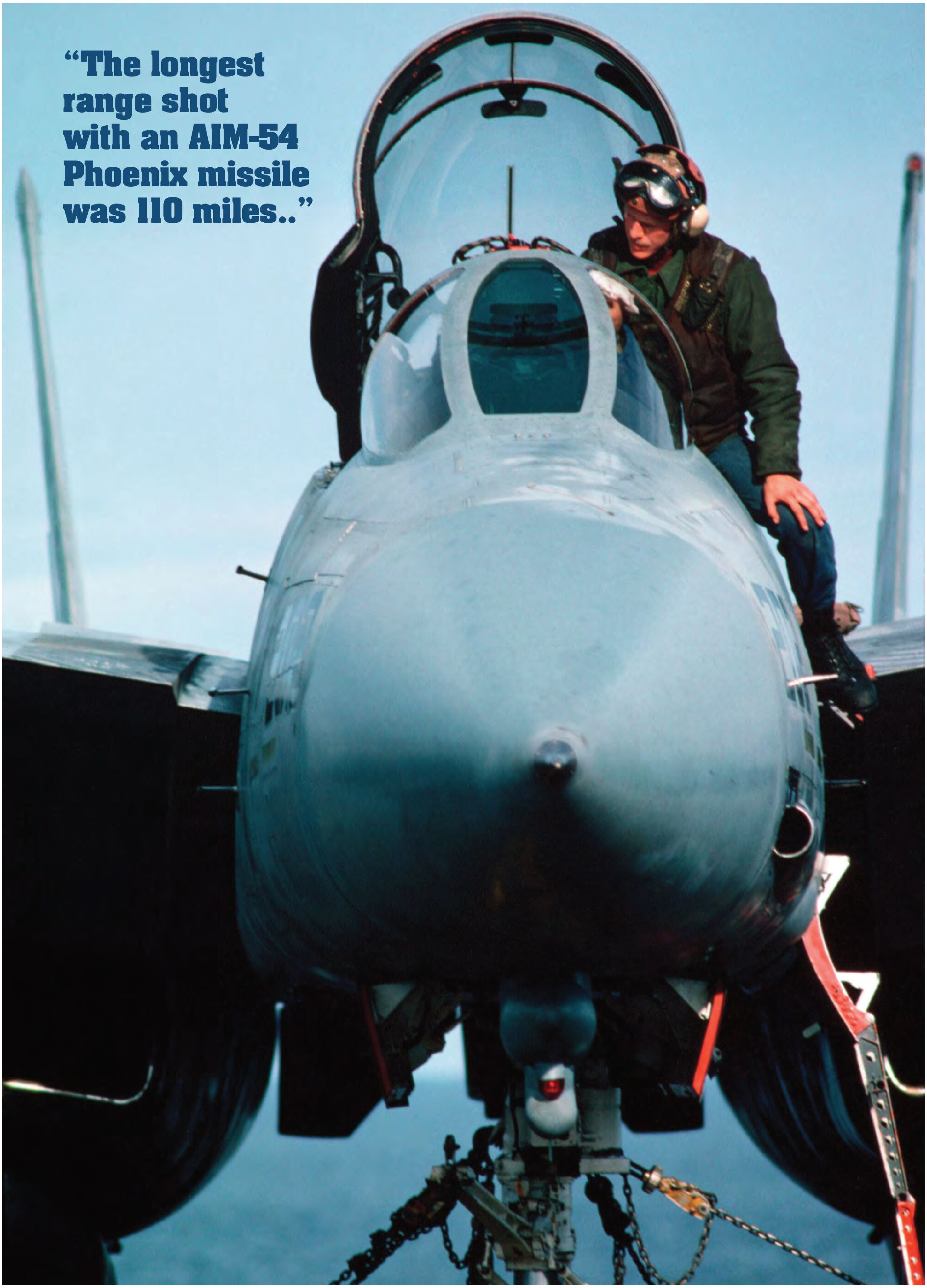
There were no NATOPS manuals for reference and Rick used the Systems Innovation Test Station lab, a cockpit setup with a live radar and antenna as part of his Tomcat training. Otherwise, learning to fly the aircraft was for the most part a self-taught process.

Dubbed SITS, the test station was installed in a facility located by Point Mugu's base beach, from where the system was operated while pointing out to sea. Engineers also used the SITS to develop the aircraft's Operational Flight Program software.

Naval Air Test Center Strike Directorate based at Patuxent River in Maryland received the first F-14 prototypes for use in the Navy Preliminary Evaluations and for engine testing. Some aircraft were transferred back and forth between Pax River and Point Mugu to meet the programme's test requirements.



Years after Rick Gildea served at the Naval Missile Center at Point Mugu, Air Test and Evaluation Squadron 9 (VX-9) operated the F-14 Tomcat from the Californian base. The squadron was an operational test unit. Perhaps its most notable Tomcat was an all-black F-14D BuNo 164604/XF1, called Vandy 1, seen here in January 1995. Dan Stijovich



"The longest range shot with an AIM-54 Phoenix missile was 110 miles.."

Loss of the first prototype on its second flight from Calverton on December 30, 1970 due to a hydraulic failure, meant the other prototypes had to enter a modification programme and a replacement aircraft had to be manufactured, which affected the delivery of subsequent aircraft.

F-14A, BuNo 157983 (MSN 4) was the first aircraft received at Point Mugu. MSN 4 was mostly used by Hughes Aircraft Company aircrew for weapons testing but to reduce weight and save money, was not fitted with programmable ramps which limited its airspeed to Mach 1.4. The aircraft was subsequently retrofitted.

As a stark reminder of the dangers associated with flight testing, shortly after Rick's arrival at Point Mugu, the NMC lost a Tomcat.

On June 20, 1973, Grumman test aircrew Pete Purvis and Tank Sherman flew F-14A BuNo 157985 (MSN 6) on a weapon separation test 80 miles offshore within the Pacific Missile Test Range.

They fired an AIM-7E-2 test article, an obsolete version of the AIM-7F Sparrow missile with a slightly thinner fuselage/casing, from the furthest aft under fuselage tunnel station. Raytheon's engineers had fitted the launcher with a smaller charge because they thought a larger charge might fire the feet off with enough force to break the missile casing.

Pete and Tank reached the specific test data point flying at Mach 0.95 (567 KIAS), at 5,000ft at 0G, and launched the missile which immediately displayed erratic flight. The aircraft was venting fuel and the left engine was on fire. Pete and Tank ejected. The aircraft descended in a slow shallow left spiral burning fiercely and hit the water nose down and broke up.

The Sparrow had not cleared the tunnel and had functioned like a razor blade ripping the bottom out of the aircraft.

In the early days of the flight test programme, personnel from three commands, the Naval Air Test Center (NATC), the Naval Missile Center, and the Navy's Air Test and Evaluation Squadron (VX-4) formed a Joint Evaluation Team in preparation for receiving F-14A aircraft BuNo 157983 (MSN 04), BuNo 157985 (MSN 06), BuNo 157988 (MSN 09), BuNo 158614 (MSN 15), BuNo 158615 (MSN 16) and BuNo 158618 (MSN 19). All six aircraft were shared with Grumman and the Hughes Aircraft Company.

Tomcat Impressions

When the F-14 Tomcat first entered the US Navy fleet, its predecessor the F-4 Phantom was a mature weapon system, sometimes described as a brick with two rocket engines. But Rick said the F-4 was very stable and didn't flop around in flight. He said: "I've always described the F-14 as a Cadillac. It was phenomenal. The way Grumman designed the aircraft with a two-person cockpit, for the crew concept, was in my opinion almost to perfection. The visibility was unbelievable. Even the air conditioning system worked.

The leap in capability of the AWG-9 radar was big. The system itself had been on the drawing board for some time and was initially designed to be used in the YF-12. Grumman then planned to integrate the Phoenix missile and the AWG-9 on the F-111B.

For aircrew, a 1961-model F-4B, equipped with a Westinghouse APQ-72 pulse-only radar with short range, X-band capability, it was hard to pick things out when looking down at the land mass. Performance of the APG-59 pulse-Doppler radar, part of the Hughes Aircraft Company AWG-10 fire control system housed in the enlarged radome of the 1966-model F-4J, the first such system with a look-down/shoot-down capability, was incrementally higher than the F-4B.

Rick said: "When we went to the F-14 equipped with the Westinghouse AWG-9, it was a dramatic difference, mostly because of the radar's 10kW of power. If targets were big enough, you could track more than six out to a range over 100 miles. This provided more possibilities as to what the aircrew could do with the aircraft."

An F-14 RIO used a primary digital display for look down and a big round computer-generated tactical information display used to present multiple targets fed from the aircraft's sensors or from an E-2 Hawkeye through the datalink. The TID supported the radar's six missile capability, tracking targets in raw radar video. Definition of the F-14's cockpit screens was so much better in comparison to the primitive designs in the F-4 Phantom."

Missile Credentials

Raytheon's AIM-7 Sparrow air-to-air missile also offered better radar and longer range capabilities on a Tomcat than an F-4 Phantom. Rick said: "You could reach out further and have the target solved much earlier than you did with the F-4. The longest range shot with an AIM-54 Phoenix missile was 110 miles. You never had anything close to that engagement range in the F-4, we used F-Pole as the term of reference for the distance between you and the target at intercept. You might shoot at 110 miles, but your target might only be 15 or 20 miles from you. If a target was coming right at you, you had to make sure you could hit that target before he reached his F-Pole range. That's where the AIM-54 gave you an advantage, your AIM-54 could get him before he could ever fire a missile.

"The AIM-54 gave another advantage. Once the missile got inside roughly nine miles or so, it switched to an active mode. You didn't even have to provide guidance to the missile. This was so different to a semi-active weapon like the AIM-7 which needed continual target updates all the to striking the target."

Weapon System Testing

Rick's tour at Point Mugu was mostly focussed on weapon system testing. A role that required the aircrew to reach a set of test points as specified by the engineers, such as the radar's edge of the envelope performance.

Rick recalled one test flight that involved testing stabilisation of the radar and the antennae. He said: "This required us to fly maximum deflection rolls in order to drive the antenna to its max deflection to determine if it was stable on the edge of its envelope. When you're doing roll after roll max deflection, trying to get the radar to validate its performance matched the specification, it's not so exciting but ensured plenty of flying."

On one weapon test, Rick launched an AIM-54 Phoenix missile in a rear quarter shot inside of ten miles against a drone carrying an electronic jamming pod actively spoofing the missile."

Flight test engineers specified the test conditions used to determine specification compliance based on evaluation of the F-14's performance specifications.

In another example, Rick launched an AIM-9 Sidewinder air-to-air missile using an expanded acquisition mode. This test was conducted at the start of the Sidewinder's integration programme on the F-14. Engineers designed one shot in which Rick had to chase and catch an AQM ballistic drone simulating a missile, from behind.

He said: "We were trying to get the Sidewinder shot while targeting an AQM that was accelerating away from us in excess of Mach 1.5. We chased the drone through 50,000ft

« US National Archives/US Navy

> **"It went right over the side and the crew punched out."**

Up close to an F-14A assigned to Fighter Squadron 32 (VF-32) 'Swordsmen' with USS *John F Kennedy* titles applied to the wing leading edge. Hey Joe Parsons

expecting it to level out at about 65,000ft, but it kept going. We kept chasing it and fired the Sidewinder at about 58,000ft, but it didn't hit the target."

Rick's most notable weapons test involved launching six missiles at six targets for which he was the aircrew test coordinator working with the flight test conductor. Practice missions had been flown before the big day. All six missiles were launched at BQM drones and QF-9 Full Scale Aerial Targets from one F-14 aircraft as scheduled. One missile, the sixth launched, overloaded the system and failed. Another missed because the drone operator was not paying full attention resulting in his drone flying out of the range. This was the only time a six-on-six F-14 missile shoot was undertaken.

Meeting a MiG

When Rick finished his tour at Point Mugu he expected to go to an F-14 squadron and was served orders to VF-124, the Tomcat training squadron at Miramar. At the time, Rick had more hours in the F-14 than VF-124's cadre of instructors. Because Tomcat hours were at a premium back then, Rick flew just 20 hours during the training squadron tour.

But Rick did get several memorable missions with VF-124. One of his fellow officers was involved in the classified Constant Peg MiG programme based at Tonopah, Nevada. The officer arranged for VF-124 aviators to fly against the Soviet jets. Rick had no air combat manoeuvring missions in the F-14 to his name, until the day a MiG-17 joined up on his aircraft at the 7:00 o'clock position.

At that point it was fight's on, Rick's pilot flew a controlled departure from controlled flight, sometimes used as a tactical manoeuvre. Rick recalled how his Tomcat tumbled end over end. That was fine in an F-4 but should not be done in the F-14. If the aircraft entered a flat spin, it was unrecoverable. In the early days of the programme, the fleet didn't know about the flat spin issue. Consequently, the Navy lost people and aircraft. Changes were eventually made to help avoid pilots avoid the scenario.

Rick's pilot kept their F-14 out of trouble and the two aviators experienced a tough fight against the American pilot flying his Soviet MiG-17.

Too Much, Too Soon?

On December 30, 1970, the first prototype Tomcat, BuNo 157980, suffered a hydraulic failure and crashed on approach to Calverton. Development was placed on ice immediately, which slowed down many aspects of the programme. Consequently, aircraft were at least a year late getting to the fleet. Subsequently, the Navy's squadron transition schedule was somewhat rushed because carrier deployments were already scheduled. Each squadron had to get itself trained up and ready for deployment. When the carrier is scheduled to deploy, it's going to deploy, and the air wing is programmed to be on board. It was mostly driven by operational readiness to get the squadron ready as quick as it could.

When any new weapon system enters fleet service, issues will be discovered. There was a broad understanding of that amongst all F-14 stakeholders and the F-14 experienced a lot of problems with its TF30 engines.

When Rick was assigned to F-4 squadrons, the aircraft were flown on and off the ship. On both of Rick's two F-14 cruises from the east coast, squadron aircrew flew their squadron's aircraft to Naval Air Station Norfolk and taxied them to a quay side ramp. They were hoisted on board and at the end of the deployment hoisted off simply because the aircraft had so many problems at the time. During the cruise, those problems cost the squadrons a significant amount of flight time.

The first Tomcat deployment to the Mediterranean took place between April 1975 and January 1976. Fighter Squadron 14 (VF-14) 'Top Hatters' and VF-32 'Swordsmen' were assigned to Carrier Air Wing 1 on board the USS *John F Kennedy* (CV-67). Rick was assigned to VF-32. Throughout the seven-month deployment, both Tomcat squadrons encountered some tough experiences with the TF30 engines.

As a consequence of rushing the F-14 into service to meet the Navy's carrier deployment schedule, the fleet learned some tough lessons. One of the first occurred in the Atlantic off the coast of Scotland.

On September 2, 1976, USS *John F. Kennedy* (CV-67) got underway for a North Atlantic deployment, with Carrier Air Wing 1 embarked to participate in three major NATO fleet exercises; Joint Effort, Teamwork 1976, and Bonded Item.

The Soviets monitored Teamwork 1976. On September 12, 1976 Lieutenant William Baker and Lieutenant Dave Leestma of VF-32 undertook the first F-14 intercept of a Soviet Tu-95 Bear 400 nautical miles west of Ireland. They escorted the Bear as it made one low pass over the ship and followed it until it was out of range. A Vought RF-8G Crusader assigned to Light Photographic Squadron 63 (VFP-63) took photographs of the Bear to commemorate the occasion.

Two days later, VF-32 lost an F-14 60 nautical miles north of Scotland when the aircrew experienced runaway engines and skidded across the flight deck. Lieutenant John Kosich, the pilot, mindful of the pack of aircraft parked forward of his Tomcat, steered the aircraft toward the deck edge. Just prior to the F-14 going over the side into 315 fathoms of water, Lieutenant Louis Seymour, the RIO, initiated command ejection, and both men landed on the flight deck with minor injuries. Three sailors from the flight deck crew suffered injuries in the mishap but recovered. Intensive deep-water salvage operations recovered most of the F-14A and the AIM-54 missile it carried.

As an air wing colleague, Rick explained the mishap: "As the pilot [Lieutenant Kosich] disconnected the hook out of the arresting gear and started to move the aircraft forward, the engines increased their power setting beyond idle, dubbed runaway engines. There was nothing the pilot [Lieutenant Kosich] could physically do to get the engine to come back to the idle setting. It went right over the side and the crew punched out."

Missile Shoot

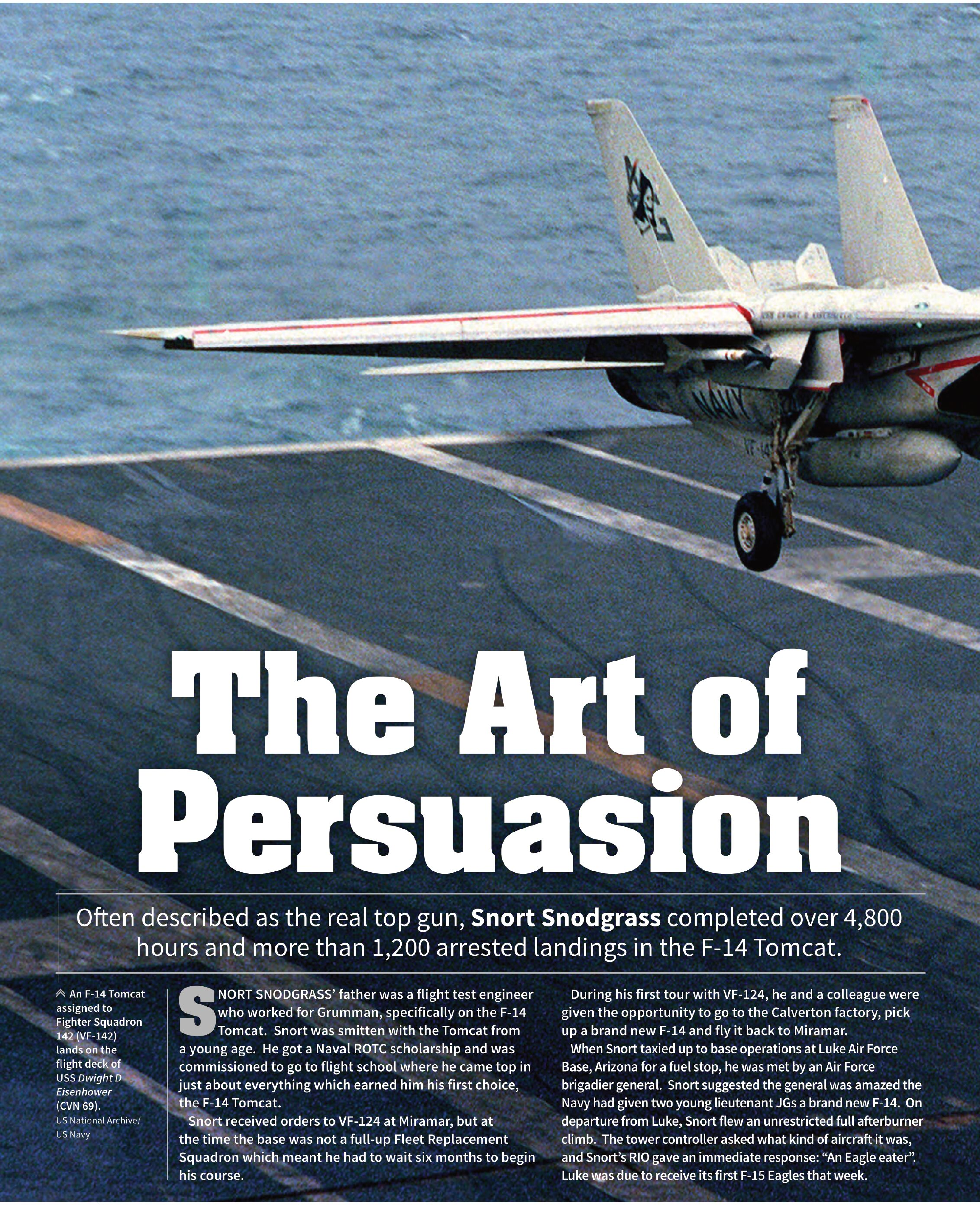
Post deployment in early 1976, Carrier Air Wing 1's Tomcat squadrons had a requirement to shoot AIM-54 Phoenix missiles on an east coast range. One option was the Atlantic Fleet Weapons Training Facility off Puerto Rico. However, the required missile shoot was to be staged with the F-14s operating from an aircraft carrier. This factor led to the Navy opting to use the Air Force range in the Gulf of Mexico off the coast of northern Florida.

Rick was one of two lieutenants serving with VF-14 and VF-32 who had experience of shooting Phoenix missiles. The squadron commanders allowed the two aviators and a test conductor from Point Mugu to arrange the missile shoot with the range management authorities based at Eglin Air Force Base. Rick and his colleagues scheduled supersonic, high-altitude Bomarc target drones as part of what was a massive fleet missile shoot, one unlike anything the range authority had ever seen before.

Naval leadership based at the Pentagon allocated 12 Phoenix missiles to the event, including two fitted with warheads.

Rick and his two colleagues helped the Tomcat make Naval history. It was the first F-14 missile shoot in which the aircraft launched from a carrier loaded with live missiles. A total of 27 missiles were shot, nine of which were Phoenix (three of the 12 went unserviceable) on four-hour missions. No other units have ever fired that many AIM-54 missiles.

《 Plane captains use MD-3A tow tractors to position F-14A Tomcats assigned to Fighter Squadron 32 (VF-32) and Fighter Squadron 14 (VF-14) on the flight deck of USS *John F Kennedy* (CV 67) in 1986. US National Archives/ US Navy



An F-14 Tomcat assigned to Fighter Squadron 142 (VF-142) lands on the flight deck of USS *Dwight D Eisenhower* (CVN 69). US National Archive/ US Navy

The Art of Persuasion

Often described as the real top gun, **Snort Snodgrass** completed over 4,800 hours and more than 1,200 arrested landings in the F-14 Tomcat.

SNORT SNODGRASS' father was a flight test engineer who worked for Grumman, specifically on the F-14 Tomcat. Snort was smitten with the Tomcat from a young age. He got a Naval ROTC scholarship and was commissioned to go to flight school where he came top in just about everything which earned him his first choice, the F-14 Tomcat.

Snort received orders to VF-124 at Miramar, but at the time the base was not a full-up Fleet Replacement Squadron which meant he had to wait six months to begin his course.

During his first tour with VF-124, he and a colleague were given the opportunity to go to the Calverton factory, pick up a brand new F-14 and fly it back to Miramar.

When Snort taxied up to base operations at Luke Air Force Base, Arizona for a fuel stop, he was met by an Air Force brigadier general. Snort suggested the general was amazed the Navy had given two young lieutenant JGs a brand new F-14. On departure from Luke, Snort flew an unrestricted full afterburner climb. The tower controller asked what kind of aircraft it was, and Snort's RIO gave an immediate response: "An Eagle eater". Luke was due to receive its first F-15 Eagles that week.

Snort was the first nugget pilot (first tour aviator) to carrier qualify in an F-14. He received orders to Fighter Squadron 142 (VF-142) 'Ghostriders' based at Oceana in the spring of 1975 and it was the beginning of a 25-year career flying the Tomcat from the Virginia base.

Snort completed two deployments to the Mediterranean with VF-142, followed by a tour with Carrier Air Wing 8 as the senior LSO flying with VF-41, then VF-43 flying A-4 Skyhawks and F-5 Tigers.

Snort then moved to VF-143 'Pukin Dogs' for a three-year tour which included two Med-Indian Ocean deployments, followed by a return to VF-101 where he served as the squadron XO and landing signals officer. His XO/LSO tour with VF-101 involved Snort overseeing all of the nugget pilots flying to the carrier for the first time. Snort recalled one of his proudest moments in that job; "One pilot, Brian Olson or Bam-Bam was disqualified on his first trip to the ship. He got a second shot and done better, but he was still not good enough and got disqualified a second time. He had it in him, I knew he could do it. He had to get the lightbulb to turn on. After a second disqualification, usually the nugget is out of the programme. I really stood up for him. The squadron CO and the admiral believed me. Bam-Bam qualified on his third trip to the ship. Halfway through his first deployment he was in the top three pilots in his squadron. He became an exceptionally good carrier pilot. I felt really good about that."

Libyan Engagements

While serving with VF-41 on the USS *Nimitz* (CVN 68) in 1981, Snort got to engage with Libyan Air Force fighters on three separate 2 v 2 dog fights over the Gulf of Sidra. One of the intercepts was flown on the day when VF-41 pilots shot down two Su-22 Fitters.

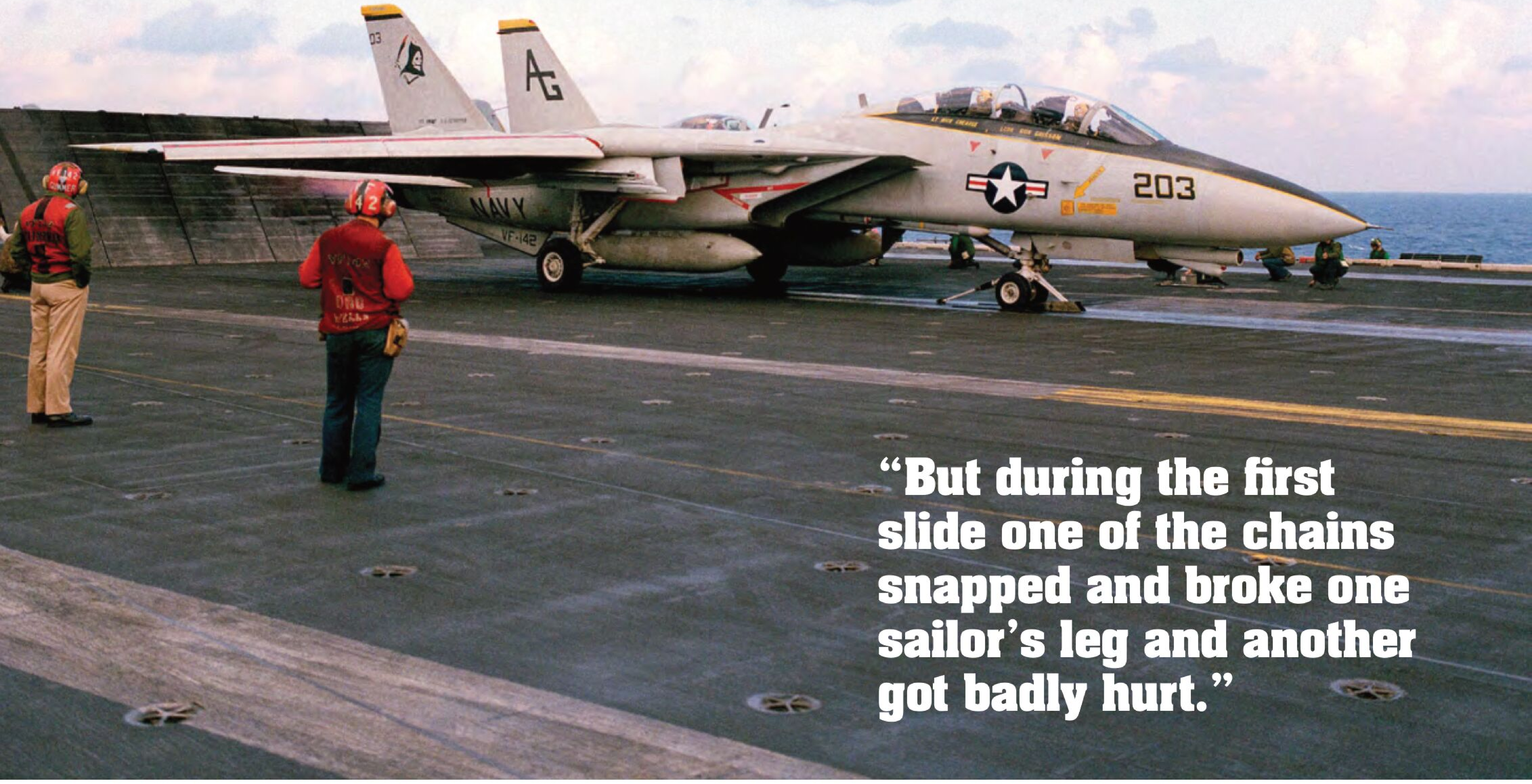
While that shoot down was occurring, Snort had a vector with two Mirage 5s. He got into a dog fight with the Mirages, which he recalls lasted a few minutes.

His next duel was with two MiG-25s, but Snort maintains this was not a contest for the F-14 saying: "Their tactics were good, but their turn rate was really bad. I turned inside them and within a minute and a half I was in a gun solution on them. It was easy to stay behind them. I'd been an adversary pilot flying tactics for ten years at that point, so was physically prepared and did not get fatigued. Once behind them, the G loads were not that high because they weren't turning that hard. They decelerated and weren't able to pull a lot of G.

"The Mirages were more interesting fights because they turned better, but still not supremely difficult. I'd already fought against Marine Corps Kfirs. The Mirages had one or two good turns and then were out of steam. Get behind one and the other would start to come around, but even though he was behind me, and even though my wingman is behind him, you still had to anticipate him trying to shoot you. You couldn't allow them to have a firing solution, so you had to defend when the guy was pointing at you, then neutralise him and come back and re-engage. They were really complicated engagements but at the same time not difficult. But for our rules of engagement, I should have shot down three aircraft. As a CAG LSO, that was the most interesting time I had with a combat flavour."

On the Edge in The North Sea

On deployment with VF-142 on board the USS *Saratoga* in March 1976, the ship was operating off Norway enduring 45 knot wind and seas of 25 to 30 feet, it was reported that conditions were like being in a hurricane.



A VF-142 Tomcat on the bow catapult of USS *Dwight D Eisenhower* (CVN 69) immediately prior to launch on a mission during Exercise Bright Star 83.
US National Archive/ US Navy

"But during the first slide one of the chains snapped and broke one sailor's leg and another got badly hurt."

« The officers of Fighter Squadron 33 (VF-33) 'Starfighters' in front of one of the squadron's F-14A Tomcats on board the USS *America* (CV 66) during Operation Desert Storm.
US National Archive/ US Navy

Snort launched from an alert 15 with blue water blowing up over the flight deck to intercept a Soviet Tu-95 Bear. Explaining, he said: "The intercept of the Bear was straightforward, recovering to the ship was not. The deck was pitching up and down 25 feet and rolling. After 12 approaches, I was almost out of gas. On the 13th approach the deck settled down enough to allow me to trap. Once the hook caught the wire, I went to full power, stopped, brought the engine power back down at idle, freed the arresting wire, raised the hook, and taxied to the right to clear the landing area. At that point, the deck keeled to the left, it was icy, oily, and missing some of the anti-skid coating from wear and tear of the high tempo flight operations. With the brakes fully locked, the aircraft started to slide to the left toward the edge of the flight deck. The seas were so big if we had ejected nobody would find us. Miraculously, the ship rolled in the opposite direction. While sliding to the right the wonderful flight deck crew tried to slap chains on the aircraft and put them in the tie-down points. They got the aircraft chained down. But during the first slide one of the chains snapped and broke one sailor's leg and another got badly hurt. We visited them both in the sick bay to say a big thank you."

Don't Act Cocky

There's a popular story that when Snort was serving with VF-143, a Marine Corps F/A-18 squadron from Beaufort, South Carolina sent a detachment to Oceana to fly against F-14s with their brand new Hornets. The squadron pilots were very touchy about their aircraft's performance.

At the officer's club on the Wednesday night some of the Marine pilots were talking to Snort and his fellow Tomcat crews about the following day's planned 2 v 2 mission. The Marine squadron's weapons officer, who had just completed TOPGUN, was acting really cocky and boasting how he could kick a Tomcat's ass in a 1 v 1.

Snort played it cool and cast a little doubt about the assertion but gave a greater level of agreement, egging the Marine officer on just a little bit. He also offered to change the following day's flight schedule so that he and the Marine weapons instructor could fight a 1 v 1. There was one term to the agreement. The loser would pay for the winner's squadron food and bar bill at the officer club on Friday night. The Marine took the bait.

Snort's skipper was sitting at the bar chatting with the CO of the Marine squadron, so he walked over and said: "skipper, I'd like to change one of tomorrow's missions from a 2 v 2 to a 1 v 1 guns only engagement. Whoever loses, that squadron will pay for the drinks and the food for the other squadron on Friday night."

Snort gave his skipper a subtle wink who said "absolutely" and while the Marine CO showed more wariness about the whole thing, the deal was agreed.

Prior to the mission, Snort told his Marine opponent that he had to conduct a maintenance check flight on his aircraft in the southern part of the range before he could start the fight.

An aviation ordnance man loads a GBU-16 Paveway II 1,000lb laser-guided bomb onto a F-14 during operations in the Arabian Sea.
US National Archive/ US Navy

“As I pointed at the Hornet, the pilot pulled really hard and bled off a lot of air speed.”

An F-14A Tomcat refuels from a US Air Force KC-10A Extender during Operation Desert Storm. US National Archive/US Navy

However, Snort went to the south end of the range but not to carry out a maintenance check flight but to dump fuel and make his aircraft really light. Snort said: “I pulled the auxiliary flap and the mid-compression bypass circuit breakers to achieve two things. One, the aircraft has an amazing turn rate and turn radius with the main leading edge flaps extended down. Second, the engines gained an extra 2,000lb of thrust per each when the mid-compression circuit breakers were pulled, though there was a little more susceptibility to stalling the engine. Bottom line the pilot had more performance.”

Snort recalled the engagement: “I manually swept the wings back to about 45 degrees and slowed the aircraft down to 300 knots in the separation. The Marine pilot thought I was going about 450 knots. That was what he expected when the wings were back. Turning in, I went to idle speed brakes, pulled hard to induce the drag of the aircraft and immediately slowed down to 225 knots, which was flap speed. I put the big flaps down. Once they locked, they are very strong. The wings moved forward. I put the flaps full down. Selected full afterburner and merged with the Hornet accelerating back to about 300 knots, which was where the Tomcat became an animal in slick configuration, it could out turn anything. The Hornet was at 450 knots pulling 8G, I was at 325 knots pulling 6.6G. My turn radius was well inside his, and faster than the Hornet. As I pointed at the Hornet, the pilot pulled really hard and bled off a lot of air speed. I merged with the Hornet and went straight up. The Hornet pilot tried to follow but ran out of energy because of the hard pitch and sat in a near vertical just fluffing. I came around, gunned the Hornet, called it dead and knocked off the fight.”

Snort went from a neutral pass to gunning the Hornet in 50 seconds and won the contest. Consequently, VF-143’s officers drank and ate for free at the club that Friday night.

Starfighter

Once his time was done with the Pukin Dogs, Snort returned to VF-101 as the squadron’s executive officer. During that tour, he screened for a command tour and became the executive officer and subsequently the commanding officer of Fighter Squadron 33 (VF-33) ‘Starfighters’. He commanded VF-33 within Carrier Air Wing 1 on board the USS *America* (CV 66) and flew as the strike leader of several missions during Desert Storm.

On one mission during the first few nights of the war, Snort was leading a package of eight F-14s tasked with fighter sweep to a group of A-6E Intruders bound for an attack on an Iraqi power plant. Iraqi MiGs were airborne, some of them were locked up by the F-14s but lived to tell another day. The Tomcat pilots struggled to get positive identification and in accordance with the Navy’s rules of engagement were not cleared to shoot.

Flying at Mach 0.49 and 29,000 feet Snort spotted a missile plume. His aircraft’s radar warning receiver immediately lit up. A surface-to-air missile closing on his jet caused Snort to fly a last ditch manoeuvre to avoid the missile. The Iraqi missile did miss but detonated right behind Snort’s jet. As a result of pulling an 8 or 9G roll, Snort’s Tomcat had departed controlled flight, went into a spin, with one engine stalled.

Surrounded by triple A, Snort recovered the plummeting Tomcat at around 11,000ft with one operative engine while flying at 200 knots. He tried to re-light the inoperative engine. Airflow was insufficient. Snort had two recognised options. Dive down to gain air speed while heading into the heart of the triple A or select afterburner and risk an IR missile shot. Snort made a compromise. He got the engine to mid-afterburner, lowered the nose a little, managed to get to almost 300 knots, got the inoperative engine lit, engaged full afterburner in both engines, and climbed away.

Despite the serious nature of the spin, the aircraft got Snort back to the carrier in one piece.

Wing Commander

Snort then left VF-33 and the USS *America* to start a two-year staff tour as the navigator of the USS *Theodore Roosevelt* (CVN 71). He continued to fly Tomcats from the TR, again with VF-41.

Snort left his navigator's job with orders to The Pentagon working in acquisition for the Navy's training command. One year later he screened for a major command and got his first choice, Commander, Fighter Wing Atlantic (FITWINGLANT) back at Oceana. He had command of all of the Navy's F-14 squadrons amounting to 350 aircraft and 5,000 personnel.

During that tour, he played a major part in turning the F-14 into a precision strike aircraft by integrating the AAQ-14 LANTIRN targeting pod. What's more, he and his FITWINGLANT colleagues achieved the objective by remaining outside of the Naval Air Systems Command normal acquisition process.

At the time, Commander Naval Air Force Atlantic, Vice Admiral Richard Sweetpea Allen was facing the reality of not having a precision air-to-ground capability at his disposal. The A-6E Intruder had been retired, and the F/A-18 Hornet was suffering from the poor quality of its AAS-38 Nite Hawk targeting pod.

Vice Admiral Allen and Snort conspired to use the fleet prototype rule, a way for the fleet to develop a system on its own. With the help of solution providers Whitney, Bradley & Brown and Martin Marietta, Snort and a team of former test pilots and engineers on the FITWINGLANT staff devised a way to integrate a LANTRIN pod on a Tomcat. In six-months, Snort and the team went from an agreement handshake to dropping a precision-guided bomb. That bomb was dropped by Snort making him the first Tomcat pilot to drop a precision-guided weapon from an F-14.

Based on his use of LANTIRN, Snort reckons the aircraft had a truly spectacular FLIR system with great magnification, really good pixel clarity, and the ability to find targets and transfer those targets to other aircraft.

When Snort spoke with the four-star admirals commanding Naval operations in the theatres in which the capability was needed, he told them they could have Tomcat precision-strike capability in six months. They asked Snort how much it would cost and how he proposed to pay for the capability. He told them: "Around $1 billion, approximately the same amount of money allocated to integrate the AIM-120 AMRAAM missile on the Tomcat. Don't put the AMRAAM on the aircraft, we still have the Sparrow. Today, the Tomcat will be much more effective as a strike platform rather than a pure fighter."

Somehow, Snort got an agreement from the admirals and within six months VF-103 deployed its Tomcats with the precision strike capability. Dubbed the Bombcat, the F-14 became a great close air support aircraft and forward air control platform during the last years of its career.

Snort flew his final Tomcat flight while serving as Commander, Fighter Wing Atlantic. He undertook a 1 v 1 fight with an F-15C Eagle flown by a friend from Langley Air Force Base, Virginia. One notable moment about his final flight. As he taxied out to the runway, four F-14s were waiting to depart. The pilots gave their boss priority. As he passed by, they all knelt their aircraft on the nose landing gear strut. Snort described the mission as very emotional. Upon landing, Snort had flown over 4,800 hours in the Tomcat.

« A catapult crewman moves out of the way after a final pre-launch check of a Fighter Squadron 33 (VF-33) F-14A Tomcat on the flight deck of USS *America* (CV-66).
US National Archive/ US Navy

Fox Two

Dave Venlet was a young radar intercept officer flying a combat air patrol mission with three squadron mates when he made world headlines in August 1981.

F-14A BuNo 162689/AJ101 landing at Miramar in February 1988. At the time, this aircraft was the CAG-bird of Fighter Squadron 41 (VF-41) 'Black Aces'. Dan Stijovich

WHILE DAVE Venlet was in flight school at Naval Air Station Pensacola, Florida he saw his first F-14A Tomcat parked on the flight line. His unexpected encounter convinced him he wanted to fly in the F-14. He was fortunate. He got assigned to fly in the Tomcat as a trainee radar intercept officer and went to VF-101 at Oceana. Dave said he really enjoyed learning about the aircraft and all of its systems, "In that era, it was all about the power of the engines and the radar to allow us to search for Soviet Tu-16 Backfire and Tu-95 Bear bombers."

Black Aces

Dave received orders to Fighter Squadron 41 (VF-41) 'Black Aces' which had returned from its first Tomcat cruise on the USS *Nimitz* (CVN 68) in July 1978. His first deployment spanned from September 1979 through May 1980 when the Nimitz sailed the Mediterranean and the Indian Ocean.

Dave's second cruise started on August 3, 1981. He was still a Black Ace, on board the Nimitz, and heading to the Med. Sixteen days into the cruise, Dave was involved in a mission during which two Libyan Su-22 Fitters were shot down by VF-41 Tomcats. The incident placed him and three squadron colleagues into the public's eye. Dave wrote an account of the mission which was published in the Spring 1990 edition of Foundation, the official publication of the Naval Aviation Museum in Pensacola, Florida. The following are excerpts from Dave's remarkable story.

Shoot Down Over Sidra

The first half of 1981 was a great time for Carrier Air Wing 8. We had a full set of pre-deployment workups aboard Nimitz which involved maximum flight time, lots of traps, and plenty of practice missiles and bullets to fire.

The Nimitz-CVW-8 team left for th–e Med in early August 1981. The Atlantic crossing went normally, but it was our first scheduled exercise that kept us all excited. There were daily briefings, discussions, and planning sessions for a live missile-firing exercise in the Gulf of Sidra - inside Qaddafi's proclaimed waters. There were surface-to-air and air-to-air firings against drone targets in a NOTAMed area of international waters near Libya.

In consideration of recent Libyan rhetoric, a ring of CAP stations was manned by the fighters during daylight hours. This was necessary to escort possible intruders into the airspace and to warn the exercise players of fouled range. Because of our close proximity to Libya, we anticipated Libyan Air Force intrusions.

A significant difference for us was a new set of rules of engagement (ROE). The new rules included a pre-approved permission to fire in self-defence. We never had that on recent peacetime deployments.

I would be flying on a CAP station both days, with the possibility of actual MiG intercepts, and on the first day I was scheduled to fire an AIM-7 Sparrow with VF-41's commanding officer, Commander Hank Kleeman.

The CAP plan had six Nimitz fighters on three stations and manned alerts on deck from sunrise to sunset. The Forrestal had the same plan using her Marine F-4 Phantoms covering the east border of the firing area. The missile shooters were not to reduce the assets available for CAP.

Hank, as VF-41 CO, liked being on the first launch of the day, so on August 18, we were airborne and topping off on the overhead tanker just as the morning sky was brightening.

Strike assigned each F-14 CAP station as it came off the tanker. We ended up on the southernmost station. This turned out to be the least exciting place to get stuck.

We orbited at max conserve and listened on the common CAP frequency to F-14 sections on the western station having full-blown turning engagements with MiG-25 and Mirage aircraft from Tripoli. The MiGs would approach the missile firing area and prevent simple rendezvous by our fighters as they forced a high-speed, head-on pass. They turned hard and attempted to get behind the F-14s. The radio calls during the ensuing dogfights convinced us we wanted to be on those west stations our next time out! On our last trip around our station before returning for fuel, we intercepted two MiG-23 Floggers that swept through without turning hard. As they continued south, we left them and landed.

Our AIM-7 shot in the MISSILEX (missile exercise) during the afternoon of the first day went great. We ran a good intercept and scored a direct hit on the drone.

Everyone thought that the Libyans were doing all they could to get into firing positions behind F-14s. No one was sure if the MiGs wanted to shoot, and no F-14 pilot gave a MiG a chance to get near his six (backside).

Like normal, Hank had us on the first wave of CAP on day two of the exercise, August 19. The last day of the MISSILEX and the last good opportunity to engage real MiGs for a while. We briefed carefully and had great hope of getting assigned to the west stations. The weather and intel briefs were sprinkled with their usual doses of humour, yet they stressed the aggressive action of the Libyans the previous day and carefully reviewed the ROE. Both fighter ready rooms briefed together (VF-41 and VF-84) because of the possibility of mixed sections. Intercept and engaged tactics were reviewed.

It was still dark when we banged off the bow, climbed overhead, and got in line to top off our fuel from the KA-6 tanker. Voices were calm and quiet in the brief transmissions from Strike assigning the fighters to stations.

"Fast Eagle 102, 107 - Strike. Proceed to station six, Out"

Oh no! Our hearts sunk. This was the same dull, no-action south station we had yesterday. Off we went and set up max conserve orbit in combat spread. We were about 80 miles north of the Libyan coast and would have ample time to accelerate with warning from the E-2 or our own radar. Again, we were disappointed as the guys out west had MiG intercepts and engagements soon after sunrise. The CAP frequency was pretty cluttered with the communications from two different 2 v 2 fights.

The officers of Fighter Squadron 41 (VF-41) 'Black Aces' in front of one of the squadron's F-14A Tomcats on board the USS *Nimitz* (CVN 68). Dave Venlet

We were cruising at 20,000ft and 250 knots to conserve fuel. Ten thousand pounds of fuel was our minimum combat package. Once the fuel state reached that level, we had to return for air refuelling or land. Hank and I discussed making one last orbit before we had to be relieved on station and return for gas. As soon as we swung south for our last lap, I got a contact right over the waypoint symbol.

I told Hank we had something and tried to get out a contact call to the E-2 over the clobbered CAP net. No one acknowledged our call. Music knew we had something as he held a good defensive combat spread position on our right side during an acceleration to 350 knots. The radar contact steadied out. The return appeared to be a single aircraft climbing and accelerating to the north, right at us.

Music and Jim in Fast Eagle 107 took an offensive split about 8,000ft above us and nearly two miles wide on our right as we headed south. We took several heading cuts away from the target flight path to build some lateral separation for a beam intercept or stern conversion. Each time we did this, the bogey turned to place us back on his nose and deny any turning room. These turns, his forcing a head-on pass, his acceleration to 500 knots, and his climb to our altitude indicated to us that he was being vectored by a ground controller who knew right where we were. None of our intercept transmissions were acknowledged by the ship or by the E-2. The control frequency was still cluttered with communications from engagements on the west stations.

At 30 miles, Jim locked the same target. A search around this return revealed no other bogeys. We were now going 520 knots at 20,000ft, slightly above and faster than the target.

At eight miles, Hank called: "Talley, on the nose, level."

At six miles, he could tell there were two aircraft in a very tight information. Five miles, Music started his turn into us so his nose would point right at us and the bogeys when we passed them close aboard. Just as we merged a missile came off the lead bogey's left wing, leaving a white smoke trail as it passed us down our left side. Hank immediately identified them as Fitters. They were in a close parade formation. Music was pointing at us, high and to our right. He also saw the Libyan missile come off the rail.

In our hard left turn across the bogey's tail, Hank reached up to turn on the master arm switch. There was no discussion in the cockpit or between the two aircraft about what to do.

The Libyan section split up at the pass. The lead climbed and turned lazily to the east as if he was watching us chase his wingman. We don't believe the lead Libyan ever saw Music because of his wide separation at the pass. Music turned in right behind him at half a mile. Hank had a Sidewinder selected with a good tone which was quickly drowned out by the sun. As we turned toward the south, I was looking out behind us to keep Music and his bogey in sight. Hank let our bogey clear the sun ball and the Sidewinder reacquired.

My first clue that Hank fired was the white smoke plume I saw behind us. I turned around to see our AIM-9 smoke trail and the missile's impact on the Fitter's tail. Hank had taken a heart of the envelope missile shot about 45 degrees off the tail at half a mile. We saw the Fitter go out of control and the pilot eject.

On the bridge of USS *Nimitz*. The VF-41 crews on the shoot down mission with the ship's CO. From left to right; Lt Jim Anderson (RIO), Lt Dave Venlet (RIO), Capt Jack Batzler (CO USS *Nimitz*), Cdr Hank Kleeman (pilot and VF-41 CO) and Lt Larry Muczynski (pilot). Dave Venlet

We then saw the smoke from Music's Sidewinder go up the tail pipe of the lead Fitter. There was an ejection from the black smoke ball, but no parachute. We rolled out with Larry in combat spread on our right and returned to the Nimitz.

Only 60 seconds had elapsed since the Libyan first fired at us. During the entire engagement, the radio frequency was almost unusable from overriding transmissions; however, just after we joined and headed north, we heard Admiral James Service's voice booming loud and clear: "You are cleared to defend yourself."

Back on the flight deck, the ordnance men immediately noticed the missing AIM-9L missiles and showed great excitement. The air boss had just told the men on the flight deck we shot down two Libyans. He also told us that we were to go straight to the admiral after shutdown.

The four of us filed into the Flag Briefing Room where Admiral Service met us. He asked simply, "What happened?" Hank took about two minutes to explain the facts. The Admiral broke out in a big smile, slapped us all on the back, and said, "You did great."

Reflections from Sidra

Reflecting on his immediate reaction to the event, Dave recalled: "I can't believe we just did that. But it very much reinforced how very well-trained and prepared for such a situation I was, in that particular case a very unexpected situation. As soon as you passed nose-to-nose in a fight and the pilot turned hard, in the back seat you knew how to reach down and flip a radar switch to a combat mode without seeing it. You didn't even have to think about it. You knew as a back seater you should never be looking out the front of the aeroplane, you should always be looking aft of the wing line. Those things happened naturally.

"We fully expected that Libyan Air Force fighters would fly out and try and intercept us and probably fly through the NOTAMed range to prevent us from shooting missiles, just as harassment, show of force."

According to Dave, whenever Hank Kleeman addressed groups about the shoot down he always said that he and his squadron colleagues, 'did what any aircrew would have done that day in the Gulf of Sidra. There's nothing special about us. But what enabled us to do what we did was the fact that VF-41's sailors had the two aircraft working perfectly that day as they did almost every day." "He meant that it was from the heart."

« **Cdr Hank Kleeman (left) and Lt Venlet (right) in VF-101's ready room at Naval Air Station Oceana, Virginia. Hank flew in Dave's back set for his first pilot flight.**
Dave Venlet

Tragically, Captain Hank Kleeman was killed in an F/A-18 landing accident at Naval Air Station Miramar on December 3, 1985. At the time of the accident, Captain Kleeman was the commanding officer of Air Test and Evaluation Squadron 4 (VX-4) based at Naval Air Weapons Station Point Mugu, California.

RIO to Pilot

Dave returned to VF-101 to re-train as a Tomcat pilot thanks to a change in policy invoked by the Navy to stem its shortage of pilots.

Pilot qualified, Dave received orders to Fighter Squadron 143 (VF-143) 'Pukin Dogs' and deployed on the USS *Eisenhower* (CVN 69). Dave returned to VF-101 for a third tour, this time as an instructor pilot, he later attended the Naval Test Pilot School in 1990 and finished his NATOPS-qualified flying career on F-14s with Air Test and Evaluation Squadron 23 (VX-23) 'Salty Dogs' in 1992.

Recalling the event, Dave said his final Tomcat flight took place at night and involved flying missile profiles at high altitude off the New Jersey coast against a land-based radar. He said: "The Tomcat will always have a soft spot in my heart. She's the girl that took me to the dance. It was the TransAm of fighters, maybe not a lot of sophistication in weapons systems, but an awful lot of power under the hood."

« **Painted in the markings of Hank Kleeman and Dave Venlet's F-14A Tomcat, BuNo 160403/AJ102 on August 19, 1981, call sign Fast Eagle 102, this aircraft is preserved at the Ronald Reagan Presidential Foundation and Library in Simi Valley, California. The real F-14A Tomcat, BuNo 160403/AJ102 is displayed at the American Airpower Heritage Museum in Midland, Texas, as restored by the Navy Flight Deck Veteran's Group.**
Dave Venlet

Tomcatter

How a young man from rural Maine forged a 30-year Navy career rising from RIO to F-14 Program Manager.

AS A teenager, Pete Williams wanted to fly in the Navy. But based on his visual acuity, he knew he couldn't be a pilot. In 1977 he joined the Navy and went through Naval Flight Officer training at Naval Air Station Pensacola, Florida. He liked the concept of flying side-by-side and thought the A-6E Intruder was the type for him. At the time, Pete's neighbour was a former F-4J pilot who flew reworked TA-4J aircraft on check flights from Naval Air Depot Pensacola, Florida. Pete listened to the heavy fighter sales pitch given by his neighbour and changed his mind. He underwent RIO training with Training Squadron 86 (VT-86) 'Sabrehawks' hoping beyond hope he would get F-14. Unfortunately, he just missed out because of his third-in-the-class ranking. Instead he was selected for the F-4 Phantom with orders to Fighter Squadron 31 (VF-31) 'Tomcatters'.

At the time of his first tour, the Navy was short of pilots and RIOs which helped Pete persuade his skipper, Commander Roy Cash (a nephew of Johnny Cash) to let him stay with the squadron as part of an agreed deal. Pete got to stay with VF-31, went through the F-14 training squadron in 1980 and started his first F-14 deployment with VF-31 on the USS *John F Kennedy* (CV 67) in January 1982.

After Pete's tour with VF-31, he received orders to VF-101 as an instructor RIO, followed by staff college before returning to VF-31 for a department head tour where he completed three deployments on board the USS Forrestal (CV 59). The first to the Med between June and November 1986, a three-month north Atlantic cruise between August and October 1987 and back to the Med and the Indian Ocean between April and October 1988 as the squadron's operations officer.

Tomcatters

During the USS Forrestal's 1986 deployment to the Med, VF-31 lost its first Tomcat to a flat spin.

F-14B BuNo 162921/AG100 of Fighter Squadron 143 (VF-143) 'Pukin Dogs' at Naval Air Facility El Centro in February 2001. At the time this was VF-143's CAG-bird featuring the JFK letters at the base of the fins denoting its mother ship as the USS *John F Kennedy* (CV 67). Dan Stijovich

On June 18, two Tomcats launched on a standard combat air patrol, one flown by Lt Steve Kenny (Pete's pilot), the other by Lt Cdr John McCarraher. Ten miles out from the ship, they received a call from a third Tomcat flown by Lt Cdr Gary Dobson. McCarraher as flight lead set up a left orbit at 15 miles and 2,500ft. They established the orbit. Dobson's RIO got a radar lock on the two Tomcats and then subsequently got visual contact. Pete looked over to the right to clear outside the orbit. Kenny yelled out. Pete looked down to the left and saw an F-14 in a flat spin. Pete heard Dobson yell that he could not control his aircraft. On the inter plane channel, both Tomcat aircrews yelled at Dobson to eject

The canopy jettisoned followed by the flash of the ejection seat rockets firing, the aircraft plummeted to the ocean in a flat spin to impact. When Pete looked down he saw the aircraft's two tails floating.

As Dobson's Tomcat approached Pete's aircraft at the rendezvous, the left engine is thought to have stalled which caused immediate asymmetric thrust driving the aircraft into a flat spin. This was thought to be a cross-control stall which occurs when the aircraft's maximum permissible angle-of-attack is exceeded while in a slipping turn induced by aileron pressure in one direction and rudder pressure in the opposite direction, the so-called cross-control. It was likely that Dobson had no time to know what was going on.

The RIO, Frank Kara, called on the emergency channel to say Dobber was with him in the water. Tragically, Dobber's chute had not fully opened when he hit the water, though his LPU had automatically inflated but the experienced pilot was dead.

Every year aircrew had to undergo spin training because of the F-14's susceptibility to flat spins. Pete said the F-14 was a forgiving aircraft 99.9% of the time, but in the wrong flight regime conditions it could occasionally surprise you.

When the USS *Forrestal* and Carrier Air Wing 6 were deployed on a three-month north Atlantic cruise in the summer of 1987, the squadrons had only been back home for nine months, and its work-ups were conducted in super quick time.

Pete said: "Initial carrier qualifications were achieved in four days conducting work-up training, an unusually short period to do so. But we also had to achieve blue water certification to demonstrate we could operate in the blue water environment. After the fourth day we moved 600 miles off the Florida shore and started blue water ops. On the second night, the admiral directed the air wing to conduct night operations in VFR EMCON."

EMCON (Emissions Control) conditions means one of two things. Either restricted emissions (no unique identifiable transmissions) or no emissions (radio silence) are used to ensure an enemy cannot triangulate the signal source and the ship using radio direction-finding techniques. Since RF transmissions are less common in the middle of the sea, even a very low power and short duration signal can stand out and make the ship an easily locatable target.

EMCON is hard in the day time and far more difficult at night. Pete and his young pilot took off in VFR conditions, with a cloud layer at 1,000ft and thunderstorms all around for 2 v 2 intercepts with two VF-11 Tomcats.

> **“The Tomcat’s capability was such that when a Hornet checked in, they’d say okay, roger that, any Tomcats available?”**

An F-14D Tomcat assigned to Fighter Squadron 31 (VF-31) ‘Tomcatters’ during an annual air defence exercise. US National Archive/ US Navy

Returning to the Kennedy in night VFR conditions, Pete found the ship with the help of a quick radar search. His young pilot boltered on his first attempt to land. Pete reckons the pilot was really out of sorts. He said: “At this point, a RIO’s job was part psychologist. You had to provide reassurance, tell the pilot he was doing fine, and would get aboard.”

On his second attempt, the young pilot landed successfully.

Once Pete got back to his squadron’s ready room, the skipper was intently listening to the ship’s air traffic control channel. A young pilot serving with VF-11 had made a couple of attempts to land and was low on fuel. This forced the air boss to launch the KA-6D tanker. As the VF-11 Tomcat was joining on the KA-6D, the tanker was struck by lightning which resulted in a "sour package". Because of this, the young Tomcat pilot could not get any fuel. As a result of fuel starvation, his left engine stalled followed by the right engine. Pete heard the engines wind down on the ready room PA in the background of the RIO's radio transmissions. The guard beeper sounded next on the PA, and the two aircrew ejected at 18,000ft on a dark night with thunderstorms all around, 600 miles out to sea. Both crew had to ride in their seats until the automatic seat separation system activated the chute at 12,000ft. A frightening windy descent and splashdown.

The pilot had climbed to 18,000ft in the hope that another tanker would arrive, but nothing happened, and the Tomcat ran out of fuel. Pete gave this account as an example of the risk aircrew had to accept back then.

Naval Air Systems Command

In the autumn of 1988, Lieutenant Commander Pete Williams arrived at NAVAIR in Crystal City, Virginia to serve as the deputy F-14 class desk officer. The class desk held responsibility for software and systems integration within the F-14 Program Office. Pete’s initial responsibility was design and integration of the ADU-703 bomb rack adapter that fitted into the Phoenix rail to enable carriage of the BRU-32 bomb rack, followed by F-14A operational flight program software updates.

Pete described his class desk tour as a wonderful trial by fire in systems engineering and acquisition. Pete followed with an 18-month tour serving as space electronic warfare commander in a Navy Combat Direction Center on the USS John F Kennedy (CV 67).

He then screened for command and went to Fighter Squadron 143 (VF-143) ‘Pukin Dogs’ for a three-year tour and was due to go back to shore duty with NAVAIR. However, before his VF-143 change-of-command, he was directed to the USS *Enterprise* as air boss. By good fortune, Pete got to fly in the F-14 again. This time at the invitation of Captain Jim Zortman, the then commander of Carrier Air Wing 17. Captain Mike Malone, CO of the USS *Enterprise* approved the notion enabling Pete to fly twice, the second of which was his last Tomcat flight.

Pete was able to use a LANTIRN pod to drop precision-guided bombs on the Udairi range in Kuwait, a full circle for Pete using the ADU-703 adapter and pod combination for the first time.

Back to NAVAIR

In 1997 Pete finally went back to shore duty re-joining the F-14 class desk with NAVAIR, now based at Naval Air Station Patuxent River, Maryland.

During Pete’s second time at the class desk, he managed the integration of a Digital Flight Control System (DFCS) for

An aviation boatswain’s mate directing an F-14D Tomcat assigned to Fighter Squadron 31 (VF-31) on the USS *Theodore Roosevelt* (CVN 71). US National Archive/ US Navy the Tomcat, designed to tackle a susceptibility to flat spin and abrupt control-induced departures. Dutch-roll damping, a stick-to-rudder interconnect, automatic spin resistance and a spin-resistance function were some of the new controls built in to the DFCS.

Aggressive in its application, the DFCS was able to dampen out many of the F-14's control susceptibilities. During DFCS flight testing, Naval Air Systems Command said the new software greatly improved departure resistance. While attempting spins, the aircraft rarely departed with the system and when it did, the departures were generally benign, with recovery from forward stick alone, and just occasionally differential rudder.

As a consequence of introducing DFCS, the Navy lost no further F-14 aircraft to a flat spin.

Before DFCS was released to the fleet, many of the best pilots graduating from flight training were selected for the Tomcat, simply because it was harder to land aboard the ship. It was nick named the Turkey because of the flapping around it did on approach to the ship. Once equipped with DFCS, pilots in the Tomcat squadrons began appearing in the top ten landing grades of their air wing.

Pete was then appointed as NAVAIR's systems engineering department head and then returned to the Tomcat as the F-14 Program Manager with PMA-241, his third tour with the organisation.

According to Pete: "Acquisition at NAVAIR is a full contact sport. You've got to put on your pads, and plough through because you're going to get an army of people that are going to tell you no. We weren't really supposed to be doing the air-to-ground capability. The Pentagon was not prepared to award funding. However, the programme manager at the time, Jack Schneider was quite a visionary. He knew it had to be done. We used money allocated to EW for developing the bomb racks, culminating at the end with the AAQ-14 LANTIRN pod and the digital ROVER system.

"A former Army Ranger was part of the NAVAIR team. He was familiar with the Army domain. He went to northern Iraq with the US Army special forces. Tomcats deployed to the theatre had ROVER installed. The former Ranger had a ROVER laptop with him. This allowed special forces troops to chat with the aircrew before they launched.

F-14A BuNo 161425 painted in the colours of VF-143's CAG-bird in 1987.
US National Archive/US Navy/Lt Higgins

Fighter Squadron 143's CAG-bird in 1988 was F-14A BuNo 162692/AG100. Note the Ike legend at the base of the fin. The squadron was assigned to the USS *John F Kennedy*.
US National Archive/US Navy/Lt Cdr Leenhouts

"Tomcats provided effective close air support for the special forces using ROVER. The Tomcat's capability was such that when a Hornet checked in, they'd say okay, roger that, any Tomcats available? They really wanted the Tomcats because it had the legs, and the capability with the LANTIRN pod. In one strike on a surface-to-air missile site, the special forces troops sent a photo of the site to the Tomcat crew so that it could be targeted. The aircrew generated the coordinates and hit the site with a Mk83 Joint Direct Attack Munition (JDAM).

According to Pete, JDAM capability was something the fleet squadrons were begging for at the time. He said: "We actually placed the JDAM code into the Tomcat's operational flight program software tapes before we were officially authorized to do so. When the Navy confirmed its requirement for the JDAM capability on the Tomcat, it was a straightforward process for NAVAIR teams to activate the software. Six weeks from the starter gun to getting the teams sent out, the fleet shacked an Iraqi intel site with a JDAM."

Reducing Operating Costs

Toward the later years of its service life, the Tomcat's cost per flight hour was around 65 maintenance man hours. To help reduce that cost, Pete was able to push through a programme to replace tired wire in the aircraft.

To help sell a re-wiring programme, Pete sought the help of a NAVAIR system safety specialist to analyse Tomcat fleet data. The result of that analysis showed statistically that an F-14 would be lost in an accident within the next couple of years caused by tired wiring.

Pete's team had also received a flight deck photo of an F-14 on a catapult launch in full afterburner. The photo showed a conflagration caused an electrical short in the fuel dump switch which caused fuel to be dumped directly into the afterburner flames. The short was discovered to have been caused by issues with tired Kapton wiring.

Pete met with commander, NAVAIR, Vice Admiral Joe Dyer to brief on the findings of the analysis and the statistical probability of losing an aircraft. Admiral Dyer asked Pete if he was sure, to which Pete replied he was. A wire replacement programme was passed. Its implementation reduced maintenance man hours by about 20%.

Reflecting on his F-14 experience during his 30-year Navy career, Pete said: "The Tomcat is like a muscle car from the sixties. It was brute force and an elegant design, but very complex and expensive to maintain. It was absolutely what the US Navy needed for the Cold War."

Best of the Best

Dave Baranek's Navy flying career led to attendance at the TOPGUN school and a follow-on tour as an instructor.

A good shot of the tactical paint scheme and the light grey scheme that preceded it on two F-14A Tomcats assigned to VF-2 in November 1989. Most squadrons operated a mix of schemes as the TPS was phased in. Dave Baranek

Dave Baranek in the RIO's cockpit of the F-14A on display at the Valiant Air Command museum near Titusville, Florida. Nicki Hovanec

DAVE BARANEK completed Navy ROTC in 1979 and undertook Naval Flight Officer training at Pensacola, Florida shortly after. Unable to be a pilot due to his visual acuity, Dave wanted to be an F-14 radar intercept officer (RIO). The course was challenging, and the F-14 slots were like gold dust. Dave graduated his class with a good placing which earned him his slot with VF-124 at Miramar and he started his course in mid-1980. Once again, Dave graduated and received orders to Fighter Squadron 24 (VF-24) 'Fighting Renegades'. He considers he learned the RIO trade with VF-24 and attributes that to his squadron colleagues, experienced RIOs, call signs Buff, Ice, Oak and Window.

The RIO's Role

Discussing the role, Dave recollected his NATOPS manual and how it laid out a RIO's responsibility in crew coordination and for navigation and communication.

According to Dave, by the time a Navy pilot got to the F-14, he knew how to navigate and communicate based on his experience of flying in the training command. He said: "Navigation and communication was assigned to the RIO just to prevent any confusion."

The RIO also had responsibility for initiating most of the check lists; take-off, landing and air combat are some examples. And for backing up the pilot doing things like checking the landing gear was down.

In combat the RIO was of course responsible for operating the Tomcat's AWG-9 radar. Before and during an intercept the RIO had to use the radar properly. That meant ensuring it was pointing in the right direction, using the best mode, and providing the pilot with a spatial picture of the battlespace; functions all undertaken inside the cockpit.

Outside, the RIO's responsibility was to drive a section of two F-14s, by painting the scenario of the bogey's position, directing a turn, and providing an altitude and a heading so the section remains offensive on the enemy formation.

Dave explained how important it was that the section had a very clear understanding of who was in the lead. He said: "In my experience that was usually the RIO who was the

administrative lead or the senior RIO. His aircraft usually retained the lead during the intercept. But the lead could be passed to the other aircraft. All aircrew had to understand that their purpose was to succeed in the assigned mission. If you got the better picture and you got the better radar, you got the lead."

In 1981, during his F-14 course with VF-124, Dave flew as wingman with Willy Driscoll, a very experienced RIO. As they were heading out to the area, Willy said, Dave my radar's acting up, you better take the lead. Dave thought Willy wanted to see how he did and avoid him letting Willy handle the hard work. Dave took the lead for the first run. Willy said okay I got it fixed, I'll be the lead this time. A subtle method of evaluation and demonstration to a brand new nugget.

During an engagement, the pilot and the RIO had to employ good coordination, a skill that could only be acquired with time. A RIO had to learn to only interrupt a busy pilot with the important details, such as this bogey will be a threat in five seconds. Otherwise the RIO should watch the bogeys while the pilot fights his. Crew coordination is everything.

A VF-211 F-14A Tomcat flying with a VMFA-314 F/A-18C Hornet during a mission in support of Operation Southern Watch in 1997. The Tomcat features a tail marking applied to commemorate the squadron being deployed during the Christmas holidays. Dave Baranek

The officers of Fighter Squadron 211 (VF-211) 'Fighting Checkmates' in front of one of the squadron's F-14A Tomcats on board the USS *Nimitz* (CVN 68) in 1998. Dave Baranek

TOPGUN

During his tour with VF-24, Dave attended TOPGUN as a student in 1982 and returned to the school as an instructor in August 1984 flying the F-5F Tiger II.

At the time, the Navy operated F-4 Phantoms, F-14 Tomcats and F/A-18 Hornets. As a F-14 RIO instructor, Dave gave lectures to F-14 aircrews, and briefed students on the mission and enemy tactics. He flew training missions as an adversary lead against all three types. All TOPGUN instructors were qualified to brief and lead adversary flights.

Dave reckons TOPGUN was everything anybody could imagine it to be for students and instructors alike. He said: "The level of effort and commitment is amazing. The Navy does not force people to fly fighters. You go into Navy fighters because you strive for that. Then you seek to go to TOPGUN. When you arrive, you are part of this incredible team, hardworking and very professional. To be a part of it is an incredible feeling."

Despite 1,200 hours as an F-14 RIO, as a TOPGUN instructor Dave had his hands full working on a new lecture. That experience proved to Dave the Navy was not employing the Tomcat quite as well as it should be.

At the time, a group of F-14 pilots at TOPGUN, including an Air Force officer, had a vision for improving intercepts. Dave worked very hard to develop an intercept lecture, one that sought to start improving how the Tomcat was used in the fleet.

Based on his own experience and practices, fleet RIOs were not using the radar's sort function to their best ability. A more structured process for radar employment was required, and students needed to be taught to be more structured.

Dave doesn't take all the credit for the lecture he devised since it was a continuation of what students got taught at the training squadron and included much input from his colleagues. When Dave completed his TOPGUN instructor tour, standardisation was better and more details about how the crew employed the radar and coordinated with each other were included in the syllabus.

The processes were adopted by the Fleet. Not only did Dave give the lecture to every TOPGUN class, he also gave it to a few F-14 squadrons.

In addition, Dave summarised the extra material for the TOPGUN journals which were published and distributed to all the squadrons. The F-14 was still relatively new, it had the best radar of any fighter in the world capable of detecting any target first and was armed with superlative AIM-54 Phoenix long-range air-to-air missiles. That said many F-14 operators realised it was time for the aircraft to mature. This was well timed because emerging threats were more capable and reduced some of the F-14's advantage.

At that time of its adoption, TOPGUN was already developing a new F-14 employment procedure as part of its continuous process to support all of the Navy's requirements to improve tactics used by F-14 pilots. TOPGUN was the lead organisation for each iteration.

Bounty Hunters

Dave received orders to Fighter Squadron 2 (VF-2) 'Bounty Hunters' and joined the unit in May 1987, made two deployments on the USS *Ranger* (CV 61) and qualified for

the TARPS mission. During deployment to the Indian Ocean, Dave was the RIO on a TARPS mission to capture images of the Iranian coast, which involved flying through the Strait of Hormuz.

When VF-2 flew its early version Tomcats, the Navy was using F-5Es to simulate MiG-23 Floggers armed with AA-7 Apex missiles.

Intercepts were flown at high speed, the F-14 crews took their shots, made turns, and tried to get away to defeat any threat missiles.

By this time, the Navy's adversary squadrons were also operating F-16s which presented a much tougher threat to Tomcat crews who were forced to fly tricky tactics to survive.

On one mission, Dave's pilot suggested pulling certain circuit breakers while on the TACS range, so the aircraft disappeared from the tracking systems. He also suggested flying at low altitude in the south of the area, right by the Mexican border.

Dave agreed. The pilot flew low and turned to the centre of the range to look for the F-16s. This manoeuvre placed the F-14s about 60° or more off the expected threat axis and at low level.

With a couple more Tomcats flying at high level to divert attention, Dave and his wingmen sneaked low and fast from the side, detected the F-16s on radar, pushed the circuit breakers back in so the ACMI pods came back on line, took radar locks and shot the F-16s with Phoenix missiles from 12 miles. Shortly afterwards, the Tomcats up above faced a reduced threat and shot down the remaining bandits.

Pulling the circuit breakers switched the TACS pod off making the aircraft invisible to the TACS system, though Dave and his wingman did use their jets' radars.

Flight Deck Ejection

In December 1981, VF-24's commander Bill Switzer and Dave were returning to the USS *Constellation* (CV 64) from a routine flight in the middle of the Indian Ocean. Bill landed and caught the number four wire, but things did not end well.

A trainee gear operator had set the number four wire, but he didn't know his job well enough and was unsupervised. Unfortunately, the wire wasn't set for the landing weight of an F-14.

The wire slowed the aircraft down but also let it go. Dave's Tomcat rolled off the flight deck at about 50 knots. Too fast to stop, too slow to fly. Bill and Dave ejected as the aircraft left the flight deck and fell to the ocean. Dave got tangled in his parachute because it opened just before he hit the water and floating on the surface, he had time to take in a view of an F-14 floating next to him, as an 82,000-ton aircraft carrier sped by.

Dave described the incident as remarkable and can still recall it all these years later and was not scared by the event because it happened so fast. "Bill said eject, our seats fired, and we were in the water. Then an SH-3D Sea King helicopter picked us up. We both attended a mishap investigation which was straightforward and quickly identified that the hook runner had not set the cable correctly." It was a lucky escape for Bill and Dave.

Two VF-24 F-14A Tomcats above the snow-covered Sierra Nevada mountains in late 1982. The squadron's tail marking was adopted a few months before this photo was taken.
Dave Baranek

Ten F-14A Tomcats parked on VF-24's flight line at Naval Air Station Miramar in August 1982. The tail markings shown in this image had been with the squadron since its days flying F-8 Crusaders. The markings changed a few months after this photo was taken.
Dave Baranek

MiG Chaser

Kevin Sullivan is an F-14 pilot who chased North Korean MiG-21s, served as a TOPGUN instructor and flew Mirage IIIs with the Royal Australian Air Force.

Kevin Sullivan flying an F-14.
Kevin Sullivan

KEVIN SULLIVAN got his Navy wings in September 1978 after finishing in the top 5% of his class, that gave him the right to select his aircraft type and the coast of his choice for training. However, Kevin did not move to the F-14 training squadron right away but remained on his Training Command squadron as an instructor for 18 months under the Selectively Retained Graduate programme. Then Kevin moved to VF-124 at Miramar and spent nearly a year on the F-14 course, finishing at the end of January 1981. He then joined Fighter Squadron 114 (VF-114) ‘Fighting Aardvarks’, one of two Tomcat squadrons assigned to Carrier Air Wing 11 on the USS *America* (CV 66).

USS *America*

When USS *America* deployed to the Mediterranean in April 1981, it became the first super carrier to sail through the Suez Canal, since the waterway had been cleared of mines laid during the Arab-Israeli war. *America* went on Gonzo Station (Gulf of Oman Northern Zone) in the Arabian Sea to conduct a standard deployment in the region.

While underway in the Arabian Sea, dust storms prevailed in the area over a period of several weeks. Sand was mixing with sea spray and obliterating visibility around the carrier. On one of Kevin’s day time recoveries, the ship declared case three, which meant instrument approaches.

Shooting an instrument approach, inside half a mile Kevin could not see the ‘meatball’ which is the light at the centre of the optical landing system. The LSOs directed him back onto centre line, forcing Kevin to bank aggressively to the left, and then to the right to achieve his trap.

After parking, Kevin looked up at the ship’s mast rising 60ft above the flight deck (which is 60ft above the water), and half the mast was obscured. With maybe a 100ft cloud base, less than a quarter of a mile visibility, and a manual approach (the F-14A did not have auto land capability), Kevin flew a challenging recovery that day.

A VF-114 F-14A escorts a Soviet Tu-16 Badger bomber over the Northern Pacific in 1981.
Kevin Sullivan

TOPGUN

In March 1982, Kevin was selected by his squadron to attend the TOPGUN fighter weapons school, a fighter pilot's PhD in air combat. Kevin said he cannot describe the level of application to which he learned to fly at the school. He said: “The way your situational awareness improves and how that increases your lethality, whether it’s in 1 v 1 combat or 2 v unknown combat, you learn to survive, learn to be lethal, when to put your nose in to engage an adversary and when to pull out and escape to fight another day.”

In those days, TOPGUN students flew missions against Soviet types operated by a squadron assigned to the US Air Force Constant Peg programme. Named the Red Eagles, it was an aggressor squadron equipped with MiG-17s, MiG-19s, MiG-21s and eventually MiG-23s. It flew from Tonopah, Nevada with the 4477th Test and Evaluation Squadron number plate.

Constant Peg was a secret programme established in 1977 to train Air Force, Navy, and Marine Corps fighter aircrews. A TOPGUN student’s typical exposure to the MiGs began with a radar intercept and a formation flight to demonstrate the MiG’s performance profile. From there, the MiG adversary pilots and the TOPGUN students flew 1 v 1 visual engagements, practicing basic fighter manoeuvring to provide real world training against a Soviet fighter. This was invaluable training and demonstrated the strengths and weaknesses of the Soviet types relative to the pilot's fighter type. Finally, the graduate flew in 2 v 2 air combat manoeuvres in which the 4477th pilots employed Soviet tactics. The programme was ended in 1988 and the 4477th inactivated two years later.

Kevin said: “To read about an aircraft that you’re theoretically going to fight, and then to be given the opportunity to actually fight one is totally different."

Pilots assigned to the 4477th were the very best from the ranks of the Air Force, Navy and Marine Corps. Kevin said they were hard to fight against, “You’re fighting machine versus machine but ultimately, it’s man versus man, pilot versus pilot. The aggressor pilots were the best around. You had to be innovative, to say, Okay, my traditional approach isn’t working. How do I change my tactics to get the advantage?

"My bandit was an Air Force aggressor pilot. He was good. Even though the F-14 was the superior aircraft, if you made a mistake, the aggressor pilots knew how to capitalise on it. You learnt very quickly, what to do and what not to do. My most epic fight in Top Gun was against a MiG-17."

Fleet pilots were only exposed to the MiGs in TOPGUN. It was a highly protected programme such that after the course, nobody discussed the MiG missions in accordance with the non-disclosure they had signed.

Aircrew who attended TOPGUN also faced electronic counter measures and surface-to-air missile threats on the Echo range

The officers of Fighter Squadron 114 (VF-114) 'Fighting Aardvarks' in front of one of the squadron's F-14A Tomcats on board the USS *America* (CV 66) in 1981. Kevin Sullivan

near China Lake in California. Echo is an abbreviation for the Electronic Combat Range (originally called the Electronic Warfare Threat Environment Simulation or EWTES). Echo range is equipped with a wide variety of threats including simulators, surrogates and real systems that provided a threat-rich environment.

Kevin rated his Echo range missions as the most physically demanding of the course because the range launched simulated missiles at the jets. "The range radar systems had powerful telescopes mounted on them. When the radar locked up an F-14, the radar operator could watch how the jet was manoeuvring and describe what the radar had locked onto. The Tomcat crew was exposed to the various recognisable audio and visual warnings associated with surface-to-air threats, and the radar operator would launch a mythical missile and announce, "SAM launch on the F-14 at 15,000ft, slightly left wing down now." The Tomcat crew knew immediately they were locked up and and performed the appropriate defence manoeuvres even though it was a simulated missile."

A VF-114 F-14A on the catapult ready for launch. Kevin Sullivan

Kevin's five-week TOPGUN course culminated with an escort mission protecting a strike group tasked with attacking an airfield, opposed by TOPGUN instructors and the assets of the Echo Range. In Kevin's words: "As real-world as a mission could get, without seeing any actual kinetic events. Once you went through that, as a pilot you were the best you would ever be."

After graduation, pilots returned to their units and began their new weapons instructor role; sharing knowledge to make the squadron a more operationally competent fighting unit.

USS *Enterprise*

When Kevin returned to his squadron from TOPGUN, VF-114 was working up to deploy on the USS *Enterprise* (CVN 65). The change of carrier was caused by Carrier Air Wing 11's move to the 'Big E', which had just completed a three-year refit in the shipyard.

Kevin described the subsequent deployment as dynamic when operating in the northern Pacific along the Aleutian Islands, around the Kuril Islands, through the Tsugaru Straits between Hokkaido and Honshu, into the Sea of Japan and to the Indian Ocean.

On its return voyage back from Gonzo Station, the USS *Enterprise* joined two other aircraft carriers underway off the Kuril Islands to form the biggest US Navy taskforce assembled since World War Two. In April and May 1983, the three carriers conducted a series of exercises in the northwest Pacific known as FLEETEX 83 involving 40 ships, 23,000 crewmembers and 300 aircraft. The taskforce undertook a counter clockwise sweep of the waters close to Russia's Kamchatka Peninsula. Air wings embarked on the USS *Enterprise*, USS *Coral Sea* (CV 43) and USS *Midway* (CV 41) conducted round-the-clock air operations designed to make the Soviets respond by putting their eastern air bases on constant alert.

During the exercise, a combined flight of six F-14 Tomcats from *Midway* and *Enterprise* flew over Zelyony Island in the Kuril Archipelago, a violation of Soviet airspace that the Navy later insisted was an accident.

The air wings were flying 24/7, the seas were heavy, surface temperature was extreme, and the flight decks were pitching. Conditions were very dynamic and very dangerous, so much so that when two F-14s returned to the USS Enterprise it was enshrouded by fog, forcing a diversion to the USS Midway, a carrier that did not operate F-14s.

While FLEETEX was underway there was additional tension between the US and the Soviets caused by the SALT treaty and deployment of intermediate range ballistic missiles. The Soviets were twitchy. They had misinterpreted NATO exercises as posturing to launch a first strike against Moscow. At one stage, they almost did bring the world close to war.

Aircrews embarked on the three American carriers were told they had to get the Soviet's attention such that if they took action in Europe, they would have to defend against the forces in the Northern Pacific. America's stance worked. On at least one occasion Soviet aircraft flew near to the carriers carrying live air-to-surface missiles.

On another occasion when returning to the *Enterprise*, Kevin spotted a Soviet November-class attack submarine at periscope depth. It was trailing behind the *Enterprise, masked in the ship's wake*. Few knew it was there. This was a double-hulled submarine with streamlined stern fins and nine compartments, the Soviet Union's first class of nuclear-powered attack submarine designated Project 627.

FOR EMERGENCY USE ONLY
1.PUSH BUTTON TO OPEN DOOR
2.SQUEEZE 'T' HANDLE AND PULL TO JETTISON CANO
WEIGHT
EVENT

Lieutenant Kevin Sullivan poses for the camera on board the USS *America*. Kevin Sullivan

Bogey Intercepts

During this operational period in the northern Pacific, the air wing intercepted lots of Soviet aircraft around the Soviet east coast and near the Aleutian Islands.

Whenever Soviet aircraft got within a certain range of the carrier, F-14 Tomcats escorted them until they departed. However, there were a few provocative displays of airmanship on both sides during the period.

Flying an early morning CAP station 20 miles off the coast of Vladivostok in international airspace, Kevin's RIO dropped way points for all three military airfields around the city. Each base had launched fighter aircraft which flew CAP station orbits overhead their territory, waiting for any breach of airspace by Tomcats.

It was a very dynamic period, the SALT treaty had just come in, and the Soviets were active in Yemen at Socotra Island. Soviet ships and aircraft were always around the carrier, and the closer the ship got to Soviet territory, the more intense the scrutiny.

Through various means, the carrier knew when the Soviets were flying out.

The Tomcats carried live Phoenix, Sparrow and Sidewinder missiles and a full gun pack. They were armed and ready. Rules of engagement were designed to avoid anything escalating above the rules of engagement.

Kevin said: "When the Soviets came out, we received a vector. Sometimes, we talked to our controllers, and sometimes we used the data link and operated in radio silence. That really surprised the Soviets. We joined up on them at the designated distance from the carrier, stayed on their wing, always positioned between them and the ship. The Soviets regularly dropped down to low altitude, sometimes to disrupt the carrier's take-off and landing cycles. Posturing, with a bit of provocation."

During Team Spirit 83, Kevin was on a CAP station off the coast of South Korea. He was vectored to fast moving jets. Kevin switched his weapon's master arm switch to ON before conducting a visual identification intercept. The air wing had been briefed that North Korean pilots were unpredictable. At 20 miles to merge, the controllers directed Kevin to knock it off. There was a lot of closure between them. They were flying fast. Kevin aggressively evaded by diving down to the surface of the ocean at maximum speed to gain distance from them. They were North Korean MiG-21s

Extreme Weather

During embarkation on the USS *Enterprise*, the F-14 squadrons suffered some engine damage caused by ice ingestion immediately after the aircraft landed on the flight deck. Ice was forming above the wing. The impact of landing on the flight deck caused the ice to separate, fall and enter the engine inlets and smash into the blades destroying the engine. The air wing modified recovery procedures to ensure that any ice melted before landing. Some days, the ship took green water over the bow, a sure indication of 60ft plus seas. It was extreme weather with 50 knots of wind. Kevin said flight operations continued in quite significant sea states, but flight ops would cease when the ship was taking water over the bow.

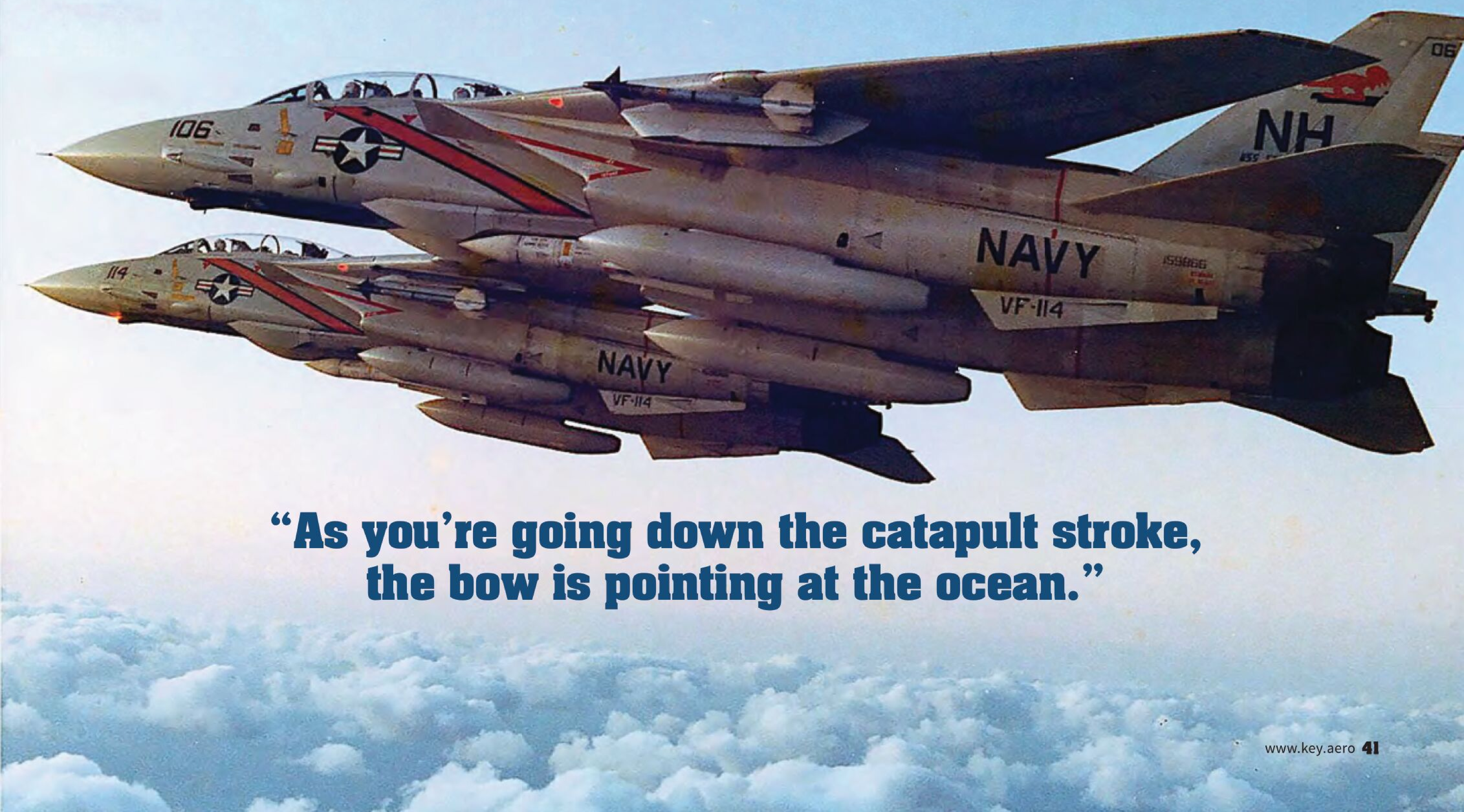
In heavy sea states, the catapult officer visually gauged the deck going up and down. He shot an aircraft off as the deck was going down so the jet shot off the end as the bow came back up.

Kevin said: "As you're going down the catapult stroke, the bow is pointing at the ocean. There's ocean right in front of you. No matter how many times you experienced it, it never became routine."

Serving as a landing signals officer at the time Kevin said: "We rigged the Mobile Visual Landing Aid System or MOVLAS. We controlled a panel of lights that showed pilots the glide slope relative to the horizon. Even though the back of the ship was going up and down, we could show the pilot the glide path we wanted him to fly to get aboard, because the normal system was way out of limits. Any time the deck was pitching, we rigged the MOVLAS system so the landing signal officer could recover the aeroplane by using his own 3° visual glide path."

Once he returned to Miramar, Kevin was selected for the first US Navy exchange pilot with the Royal Australian Air Force. He flew Mirage IIIO(A)s as a fighter combat instructor for three years, left the Navy in 1986 and joined Qantas Airways.

Each packing a single AIM-9L Sidewinder and one AIM-54 Phoenix missile, two VF-114 F-14A Tomcats look every bit combat ready to defend the fleet. Kevin Sullivan



"As you're going down the catapult stroke, the bow is pointing at the ocean."

Test Pilot

Attending the Naval Test Pilot School has kudos and many pilots graduating from it then serve with Naval Air Systems Command. However, few go on to become astronauts.

An F-14 Tomcat assigned to Fighter Squadron 142 (VF-142) lands on the flight deck of the USS *Dwight D Eisenhower* in June 1980. The aircraft is loaded with live rounds of the AIM-9L Sidewinder and AIM-54 Phoenix missiles. US National Archive/US Navy/PH1 Dave Maclean

JOE EDWARDS first flew the F-14 in 1982 and deployed on carriers from 1983 through 1992 flying with VF-143 'Pukin Dogs' and then VF-142 'Ghost Riders'.

At the end of his fleet career, Joe's last carrier landing became one of those stories from the annals of Naval Aviation that is passed down from generation to generation. Midway through this flight, flying at over 600 mph the aircraft's nose radome released, swept back, smashed into and shattered the canopy, then hit him in the face and chest. Now injured with no oxygen or communication with the ship or his backseater, Joe had to land the aircraft with an open cockpit, a broken arm, a broken shoulder and with one eye blinded by shards of glass.

Lebanon

On October 24, 1983, aircraft assigned to Carrier Air Wing 7 operating from the USS *Eisenhower* (CVN 69) conducted missions over Lebanon in response to a Hezbollah bomb attack on a US Marine Corps compound in Beirut the previous day.

Assigned to VF-143, Joe flew fighter escort and reconnaissance missions in the response using the TARPS pod, and his squadron faced a variety of threats; small arms fire, AAA, SA-6s, SA-7s and SA-8s surface-to-air missiles.

When Joe attended TOPGUN his squadron's experiences of operating in a hostile environment were of interest to the TOPGUN staff. The significance of the experience gained over Lebanon related to how the tactics and techniques employed helped to counter hostile surface-to-air threats. It was the first hostile environment faced by Navy pilots since the Vietnam war.

Some of the techniques were quite simple, such as avoiding flight near cloud decks that would contrast the aircraft and the clouds to impair visual acquisition by hostile forces.

The Naval Fighter Weapons School is the repository for such knowledge and incorporates combat lessons learned which were used by Navy pilots flying missions in subsequent conflicts, such as over Kuwait and Iraq in Operations Desert Shield and Desert Storm.

Attending TOPGUN

Joe attended TOPGUN with his squadron mate radar intercept officer Nels Peterson. They landed at Miramar on a Sunday and started the course the next morning. For the next five weeks, the two aviators just ate, slept, and flew, sometimes four flights a day around the desert southwest.

Joe recalled the course to be fast-paced. He said: "You had to be an adult and stand on your own. You had to keep your aircraft maintained with the help of a small but exceptional group of squadron maintainers, who worked very hard to keep the jet fully mission capable.

"We flew right down to the deck, as fast as the F-14 would go, to very high altitudes and fought a wide variety of aircraft. Sometimes, two students flew against eight of the TOPGUN school's own aggressor aircraft. Generally, like most gun-school students, we were beaten up a bit on days one, two and three, but by Thursday we could hold our own, and by Friday we usually came out on top. We faced new scenarios each week – different surface to air threats, different threat aircraft and missiles. When we flew back to Oceana my proficiency in the Tomcat was probably greater than at any other time in my career."

Describing the TOPGUN school, Joe said: "Compared to other weapons schools, back in the day, it was small, it was focused, it was exclusively air to air. Everyone, students and instructors, was honed to a fine edge. There was no bureaucracy. There were general guidelines around the things that you could do but it was very much singularly focused on building air to air skills to take back to the fleet, with the graduates becoming their respective squadron's training officer. The 24, 25-year old TOPGUN graduate returning to his fleet squadron had to adapt to teaching his peers.

Joe said you learned so much at TOPGUN. He said: "When you returned home it was easy to identify things that would contribute to the tactical and combat efficiency of the squadron, as you were recently the beneficiary of the latest in tactical thinking delivered by the world's finest fighter weapons school. And you wanted your squadron colleagues to open up and discuss what was commonly accepted as doctrine so the ins and outs of that information could be interchanged.

"In those days, the Navy depended upon us to do well at TOPGUN without putting an instructor in the back seat or leading us into an engagement. We not only learned a lot about the threats, but we also learnt a lot about how other Navy aircraft types and their systems operate. We learned how to combine all of the aircraft types and find the best ways to employ those jets, working together against the aggressors in any particular scenario. This enabled us to spread our knowledge not only around our squadron but around the air wing too.

Joe concluded: "The idea was not to strictly take one pilot, one RIO from a squadron and make him an outstanding fighter crew. The idea was to do that and in the process train young training officers who would return to their squadron and train the squadron pilots and RIOs in the same tactics and the same methodologies that at least, up until that point, we had found to be most successful. I have always thought the fleet squadrons did a really nice job of selecting the right people to go to the school, which perhaps reflects the fact that I've never known of anyone that didn't make it through the course."

Flight Testing the F-14D

After completing his US Naval Test Pilots School course, Joe led NAVAIR's developmental flight test programme of the F-14B and the F-14D versions, those powered by more powerful General Electric F110 engines and in the case of the D-model equipped with the APG-71 digital radar, new cockpits and weapons systems.

Joe said he was afforded tremendous opportunities to fly the F-14 in the fleet, but said it was very special to have the opportunity to flight test the first articles of the F-14B and F-14D from Grumman's flight test facility at Calverton, Long Island, New York and Naval Air Station Patuxent River, Maryland.

It was the first time the Navy had assembled an integrated flight test team comprising Grumman representatives, pilots and RIOs as well NAVAIR engineers and aircrew from Pax River. The objective was to avoid duplicating effort, save money, and get the aircraft to the fleet quicker.

As a young pilot, Joe flew with Kurt Schroeder who worked for Grumman between February 1972 and December 1995 and served as the company's chief test pilot. He said: "The opportunity as a young test pilot to be able to tap into Kurt's knowledge and experience and be able to walk from my office to the production line and ask people building the aircraft questions and learn from them, was tremendous.

"In flight test, you not only had the opportunity to fly something that no one else had yet flown, but you also had the responsibility to make sure, to the best of your ability, that it was going to be the kind of aircraft the fleet needed. In the Navy, you had the pressure associated with the fact that you would be going back to the fleet and fly with the aircrew for whom you were assisting in the development of their type of aircraft. On a day to day basis, you were going to be around people that could pat you on the back for the great job that you had done or might criticise you if you had done poorly. Combine those aspects together, plus the professional enjoyment associated with working with the great engineers at Patuxent River and the great engineers and pilots we had at Grumman, it was a great thing."

Joe was the first Navy pilot to fly the F-14D with RIO Scott Stewart. It was a brand-new aeroplane, with a new digital radar, electronic warfare system, cockpits, an infrared search and track set, and advanced computers. It had fantastic performance.

In 80% of the test points flown, Joe got the aircraft to the particular test condition required, plus or minus half a knot or half a nautical mile per hour. According to Joe, out of control flight, the spin programme, was the most dynamic event in the F-14D's flight test programme. He said: "The Tomcat flight control computers put few constraints on the pilot's control inputs and if you mishandled the aircraft, you could induce some eye watering departures from controlled flight that could send the aircraft into a spin. Under the right conditions, inertial forces could couple to depart controlled flight – it would bang your head against the canopy as it cut loose and if allowed to continue it would very quickly go into a flat spin. And of course it had the more well-known flat spin mode, which we considered to be unrecoverable."

The F-14D flight test programme had a bigger budget than all of the NAVAIR Strike Aircraft Test Directorate's (SATD) tactical aircraft combined. The propensity of F-14D flight testing was undertaken by a SATD detachment at Calverton except for carrier suitability. That was conducted at Patuxent River by a dedicated division of the SATD using the instrumented catapult and arresting gear located there.

After Joe left the Navy, he joined the National Air and Space Administration, trained in Houston, Texas and became an astronaut flying Space Shuttle missions to the Mir space station.

The original home of TOPGUN, Naval Air Station Miramar famous for its old fashioned hangar bearing the legend FIGHTERTOWN U.S.A. US National Archive/US Navy/PHAN Gregory McCreash

Slugger and a Knight

From nugget RIO on F-4 Phantoms to commander of Carrier Air Wing 17, this story proves the service life of an F-14 Tomcat RIO is a busy one.

LT SMUDGE Potts made his first flight in an F-14 Tomcat when he was serving in an F-4S Phantom squadron, not even qualified in the jet. Smudge was assigned to VF-161 'Chargers' in Carrier Air Wing 5 (CVW-5) on the USS *Midway* (CV 41) on a northern Pacific cruise in September 1982. The Midway was operating with USS *Enterprise* (CVN 65) with Carrier Air Wing 11 embarked.

On the day in question, the Enterprise was engulfed in a bank of fog, typical conditions for the northern Pacific, which prevented two Tomcats and an A-6 Intruder from recovering to the ship. All three aircraft recovered aboard the Midway. The respective commanding officers came up with a cross deck RIO swap.

Two Phantom RIOs got to see their future jet and two Tomcat RIOs got a taste of the past. Lt Smudge Potts was selected and embarked on board the Enterprise only to chalk up three hops in the F-14 in one day.

Smudge recalled that the stand-out aspect of flying in a Tomcat for the first time was the slow landing pattern speed which he describes as astonishing.

At the end of his tour with VF-161, Smudge got orders to VF-101 the Tomcat Fleet Replacement Squadron at Naval Air Station Oceana, Virginia. His first fleet squadron was Fighter Squadron 103 (VF-103) 'Sluggers'. During his two and a half years with VF-103, Smudge deployed on the USS *Independence* (CV 62). Upon return from his first cruise, VF-103 transitioned to the F-14A+, the performance of which was, according to Smudge, just breath-taking with the big F110 motors.

Providing more insight, Smudge said: "During a power demo flight, my pilot started with an airspeed of 250 knots at 5,000 feet. As he edged the throttles all the way forward it felt like the aeroplane was getting away from us. I'd never experienced anything with acceleration like that. We got to 450 knots and went straight up, topping out at 32,000 feet and 250 knots, it was just incredible. The F-14A+ performed at 30,000 feet, like the F-14A performed at 20,000 feet."

After attending War College, Smudge screened for commander, Carrier Air Wing and received orders for Carrier Air Wing 17. He flew Tomcats with VF-103, renamed the 'Jolly Rogers', and deployed on board the USS *George Washington* (CVN 73) between June and December 2002.

Two F-14A Tomcats assigned to Fighter Squadron 154 (VF-154) perform a section roll off Saipan in the Mariana Islands. US National Archives/US Navy/Cdr Smudge Potts

Smudge conducted multiple missions over Iraq in support of Operation Southern Watch; the final mission before Operation Iraqi Freedom began.

He said: "We routinely flew six-hour missions, but I had one double cycle where I ended up flying an eight-hour mission. Under those circumstances you've really got to groom the aircraft. Our F-14s weren't new and leaked hydraulic fluid. The squadron had specific teams inspecting the aircraft to ensure there were very few hydraulic leaks before a mission. I don't think we lost one mission because of that. We really had to pay attention to the jet's maintenance because in peacetime we normally fly two-hour cycles."

On his second deployment as commander, Carrier Air Wing 17 in June 2004 on board the USS *John F Kennedy* (CV 67) Smudge flew missions to Afghanistan. He did not experience anything notable from a combat perspective but cited the transit through Pakistani air space as the most worrying aspect because of close proximity to Iran. Navy E-2s searched Iranian airspace to ensure no bogeys came close. On a lighter side, once in Afghanistan, Smudge recalled his most surreal experience while flying. This involved aerial refuelling from an RAF TriStar tanker aircraft. Smudge relived the event: "We came cruising up and the RAF air engineer said in his thick British accent, what would you like to hear? Referring to music. So, there we are, tanking over Afghanistan listening to U2! I loved flying with the Brits."

On that occasion Smudge was flying a TARPS escort mission though his jet was loaded with bombs. Smudge said: "We got a troops in contact call, which means we weren't allowed to fly below 15,000ft. We went to a tanker really quick, topped off and then headed off from the eastern coast of Pakistan. By that time, the troops were too close for us to drop bombs, so we went straight in at 100ft as a show of force. The Hornets strafed, then we strafed and right after the Hornets dropped munitions which flattened the building. Unfortunately, we lost one soldier killed in the ambush.

"The interesting aspect of that engagement was trying to get our eyes on the troops. They were popping smoke, but we couldn't see it. The most effective piece of gear they had was a signal mirror. As soon as they used it, we picked the party up. We were on station over the engagement for about 20 minutes, went back to a tanker before heading to the northern part of the country to conduct the original TARPS mission."

Divert to Tonopah

While serving with VF-101 during a detachment to Fallon, Nevada, Smudge's aircraft suffered a severe hydraulic failure after an engagement with a Constant Peg MiG, to the point where the air going through the hydraulic lines were causing the flight controls to respond to un-commanded inputs. Smudge said: "It was severe, to the point that the aircraft jumped really hard upward and to the left. I asked the pilot; did you do that? 'No, I didn't' he said. Well if that happens again, I'm jumping out of this thing. Fortunately, it didn't. We had to land at Tonopah but were unable to stay at the base overnight because the F-117s were based there. Everything was classified and we had received no briefing.

"When we returned to the base to collect the aircraft, it was the only aeroplane visible on the ramp. Based on the hydraulic failure we had endured the landing gear should have been blown down to run a cycle and check it. We asked the Air Force personnel if they had drop checked the aircraft. 'No,' they said, 'just get this thing out of here.' We stressed that it needed to be drop checked, but we got the same response, get this thing out of here. We flew stiff-leg from Tonopah to Miramar where VF-124 fixed the problem for us.

"So, there we are, tanking over Afghanistan listening to U2! I loved flying with the Brits."

F-14B Tomcat BuNo 161435/103 wearing the CAG-bird colours of Fighter Squadron 103 (VF-103) 'Jolly Rogers'. US National Archives/US Navy

F-14A Tomcat BuNo 161612/NF110 of Fighter Squadron 154 (VF-154) flies near the summit of Mount Fuji, Japan. US National Archives/US Navy/Cdr Smudge Potts

We then flew back to Oceana.

"On another occasion while serving with VF-103, I was flying a TARPS mission in the middle of the state of Virginia. Once again, my aircraft suffered hydraulic failure causing the flight control to repeatedly spasm out. Fortunately, we were able to safely return to Oceana. Initially I thought my pilot was trying to avoid a bird or another aircraft. As the incident played out, I looked down to the left and saw a farm house. My thought was this, if I have to get out of this aircraft, at least I can get to that farm house to get to a phone and call back. After the debrief, my pilot told me he thought the same thing."

Rating the AWG-9

Smudge believes the AWG-9 was a superb weapons system. He said: "The big disadvantage with the system, the one that had to be correct, was the tiny pulse display in the back. That was the biggest piece of s**t I'd ever seen, as were the ergonomics. As a Phantom RIO, I liked to use pulse a lot because I could do all kinds of creative things with that. I could use the sights to track a target down low. I got really good at it, particularly when the enemy was Doppler jamming. Even if they were noise jamming, in pulse I could get around that too.

"We nicknamed the round green display in the aft cockpit, the urinal. It was replaced with a digital programmable PID which provided much better resolution with the LANTIRN pod, the reason the PID was fitted, but it was a very nice piece of gear."

Smudge summed up the AWG-9 radar as a good weapon system that was designed to acquire and track Soviet bomber aircraft and would easily track airliners in excess of 100 miles depending on the operating mode.

Japanese Ops

Smudge served as the commanding officer of Fighter Squadron 154 (VF-154) 'Black Knights' based at Naval Air Facility Atsugi, Japan. During one of the regular short deployments on board the USS *Independence* (CV 62), sister squadron VF-21 had a Tomcat on catapult four, one that did not have a jet blast deflector. The flight deck directors taxied another Tomcat too close behind the VF-21 jet. When the pilot of the VF-21 aircraft powered up, it blew the other Tomcat around, the nose gear dropped down into the catwalk, positioning the jet with its tails up in the air. The canopy blew and the crew ejected. Both survived. The RIO went up higher than the island though the pilot's chute just opened before he hit the water.

Discussing the differences of squadron life in Japan compared to home, Smudge cited readiness levels as the stand-out aspect. He said: "Readiness is lower in Japan than what you would have in the States, but it is constant. Carrier Air Wing 5 constantly goes to sea for three or four months at a time, on fleet activity deployments to retain currency. During my three-year tour as VF-154's CO, I spent 50 days at the base each year for three years."

Smudge said squadron operations present more challenges in Japan because all the major training activities involve deploying overseas; the Republic of Korea to use a bombing range that involves recovering into Osan Air Base for fuel; Andersen Air Force Base, Guam for missile shoots; and a 685-mile leg to Iwo To, Japan for FCLPs. But it was a very enjoyable tour."

When Smudge retired from the Navy, he had managed to serve with units that operated each type of Tomcat except for the F-14D.

A VF-103 Jolly Rogers' F-14B Tomcat launches from the flight deck of USS *George Washington* (CVN 73). US National Archives/US Navy/PH3 Andrew Kaeding

Jolly Roger

A tale of three types; a pilot who qualified to fly the A-6 Intruder, the F-14 Tomcat, and the F/A-18 Hornet.

An F-14B Tomcat assigned to Fighter Squadron 103 (VF-103) 'Jolly Rogers' in the sky over Iraq during a combat mission in support of Operation Iraqi Freedom in August 2004. US National Archives/US Air Force/ SSgt Lee Tucker

A SEASONED Tomcat pilot for 25 years, Mark Guadagnini's career certainly didn't lack for variety. He earned his wings in 1982 and served as an A-6 Intruder pilot with Attack Squadron 65 (VA-65) 'Fighting Tigers'. He became a landing signal officer with Carrier Air Wing 8 and commanded F/A-18 Hornet-equipped Strike Fighter Squadron 15 (VFA-15) 'Valions'. Then he attended Naval Test Pilot School and served for three years as a test pilot and instructor and flew as the chase plane lead for the A-6F Intruder and F-14D Tomcat at Calverton as a NAVAIR test pilot. He served as air wing LSO on the USS *Theodore Roosevelt* during Desert Storm flying both A-6E Intruders and F-14 Tomcats before finishing his Navy flying career as deputy commander and ultimately commander of Carrier Air Wing 17.

Guadagnini took a different path to most to fly the F-14. He cross-trained to the Tomcat during his first tour flying A-6E Intruders, by completing a ten-flight syllabus. At the conclusion of his short course, 'Guad' like all trainee pilots had to qualify at landing on the carrier, initially during the day, culminating at night.

Night Cat Shot, Night Landing

Discussing the final phase of his training, Guad recalled his first night time catapult shot in a Tomcat. An event that threw up a surprise. Guad said: "I ran the engines up, ran through the checks, everything looked good in the cockpit. The catapult fired, and the inertial navigation system immediately failed. The head-up display failed, and multiple emergency signals sounded in the cockpit, right off the catapult into a very dark night."

Generally, pilots flew the Tomcat using the cockpit displays and the head-up display, even during the cat shot. Guad on the other hand used his own method. He flew every simulator with the head-up display, the main altitude reference, switched off, and practiced flying the aircraft using the small mechanical gyro.

Guad immediately transitioned to the peanut gyro, his only available altitude reference, and flew the aircraft away from the ship. He climbed a little higher than directed. He could not move the throttle and had no navigational aids. Levelled out at 5,000ft, he did some troubleshooting, and concluded the aircraft was unserviceable.

He dumped fuel and configured the aircraft for his first night landing with no head-up display, no main altitude reference, no ILS, and no booster throttles, just the gyro and a controller talk down.

The throttle problem caused Guad the biggest challenge on final approach. He said: "Normally Tomcat throttles were humongous to use. There was a technique called walking the throttles which involved making gradual movements left and right, but no big throttle movements. The technique only worked if the throttles were boosted and functioning normally. These were big throttles. The pilot could only walk one of them at a time. Just to move a throttle required about 6lb of force. That was a challenge."

Guad described the experience as the most challenging landing he ever made in an aircraft, though he was given a grade known as Okay 3 underlined, because of the emergency.

Mission Over and in Iraq

Between June and December 2004, the USS *John F Kennedy* (CV 67) made its final cruise after 36 years of service. Guad, serving with Fighter Squadron 103 (VF-103) 'Jolly Rogers' flew multiple missions over Iraq when the ship was underway in the Persian Gulf.

He recalled a more notable flight that involved a re-tasking order for him to lead a rapid strike mission. Talking to the controllers, Guad established the weapon payloads for each aircraft in the group and their respective fuel state. The jets needed fuel, so an Air Force tanker was vectored to a rendezvous. Waiting his turn to plug into the drogue, Guad watched his fuel gauge going down. He was flying deep inside Iraq, the *Kennedy* was 600 miles away, and the diversion field was in Iraq.

Guad explained: "My RIO, a lieutenant junior grade on her first deployment, called bingo [the term used for the return to base fuel state]. I passed the mission lead role to another senior pilot, and immediately flew a bingo flight profile direct to Balad Air Base without a chance to go to the tanker. Had anybody ever told me I was going to be landing an F-14 in the middle of Iraq, I would have told them they were full of horse manure.

"It's after midnight, combat conditions were in effect at Balad so all of the lights on base were out. I figured out the way to the transient fuel operation, shut down the aircraft and got out. When I asked my RIO to refuel the jet while I went to speak with the ship and let them know we were OK and would be back on deck around 3am, she said she had not qualified in cross country ops when she would have received instruction. We switched jobs.

"The two young airmen who were helping us turn the jet did not know how to refuel a Tomcat either. So, at that point, I'm the only person in Iraq who knew how to fuel an F-14. After hooking up the fuel line, refuelling took 20 minutes. The RIO returned to the jet having successfully spoken to the carrier. We strapped in, I got the avionics back up, started the engines, took off shortly after, and landed back on board at 3:30 in the morning. We then learned that the strike comprising other Tomcats, F/A-18 Hornets and Air Force F-16s, had been successful."

Moroccan Low-level

Guad was trained in the air-to-ground role from his days flying the A-6E Intruder. He had learnt how to fly low and fast and was good at it, not just in the A-6, but the A-7E Corsair and the F/A-18 Hornet too.

On *Kennedy's* return voyage from the Persian Gulf, underway in the western Mediterranean, Carrier Air Wing 17 participated in local exercise with the Royal Moroccan Air Force.

Once again, Guad got a chance to fly at low-level. On one mission he flew through the mountains of Morocco, which he described as one of the most spectacular low-level opportunities he had ever flown. His RIO was a lieutenant junior grade who was not used to flying low to the ground, so Guad agreed to only fly as low as she was comfortable with.

At one point, Guad was flying along a valley at 200ft and 500mph calling the altitudes and turns, with 4,000ft peaks above. His RIO had said nothing and seemed comfortable, Guad asked her how she was doing. "I'm okay," she replied in a softer voice than usual. Guad realised she definitely was not okay, but nervous and climbed up to 500ft, where the speed-rush baseline is much different. Talking about it on the way back, Guad said: "I told you to not let me go below your comfort level." The young RIO was clearly a polite person. "I wasn't comfortable, but clearly you were, so at least one of us was good to go," came her reply.

Almost

Guad was almost the first pilot to shoot a Phoenix in combat on a mission in Iraq. Flying with F-15s, F-16s and F/A-18s in a no-fly zone mission over the country, the F-15s got vectors to two Iraqi aircraft while Guad was vectored to another aircraft showing as an Iraqi MiG. He had a suspicion there was another Iraqi jet out there. Sure enough, a fourth Iraqi aircraft popped up. Flying in a good position to pursue the jet, Guad received clearance to fire, armed the master arm switch ready to shoot. The shot got called off because the MiG had returned to airspace outside of the no-fly zone and therefore no longer in violation of the rules.

Back on board in his squadron's ready room, squadron mate Smudge Potts called Guad into his office and sat him down. He said: "Holy s**t Guad, I thought there you were this A-6 guy who was going to get the first ever Phoenix kill in the Tomcat!"

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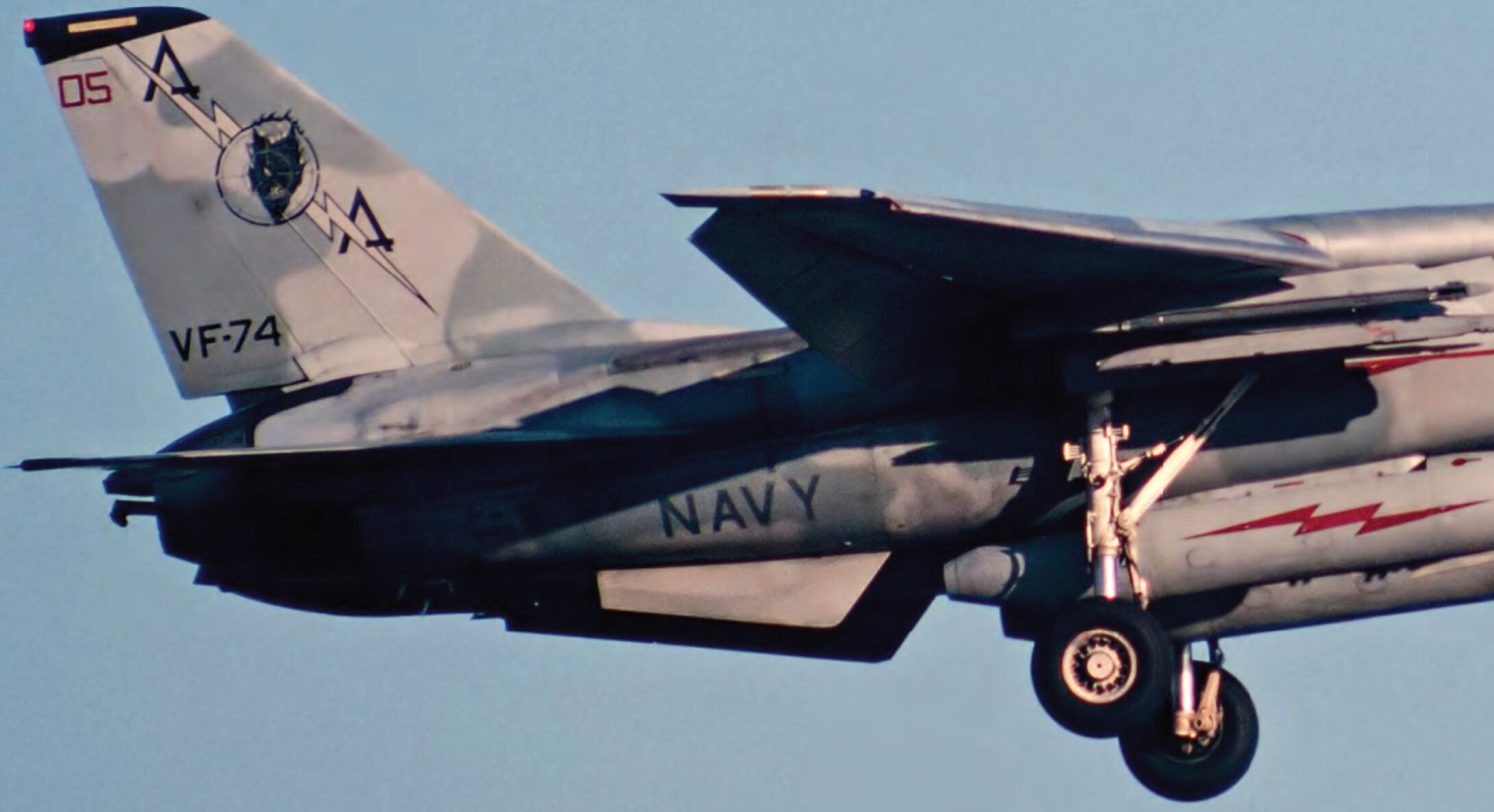
Mike the Mechanic

State of the art aircraft require a full backup team to keep them in fighting trim. **Mike O'Brien** gets to the nuts and bolts of being an F-14 plane captain.

MIKE O'BRIEN joined the US Navy because he wanted to work on fighter aircraft and go to sea. After training, he served his first tour at Naval Air Station Moffett Field, near San Francisco, California working in aircraft intermediate maintenance on P-3 Orion maritime patrol aircraft. He completed his enlistment, then re-enlisted and received orders to Fighter Squadron 74 (VF-74) 'Be-Devilers', an F-4J Phantom unit based at Oceana. Shortly after his arrival, VF-74 transitioned to the F-4S model and deployed on the USS *Forrestal* (CV 59) for the Navy's final Phantom cruise in June 1982. Returning to Oceana in November 1982, VF-74 started its transition to the F-14.

Mike undertook his F-14 aviation structural mechanic training with VF-101. It was a dream come true. He liked F-4 Phantoms but recalled that the aircraft was difficult to work on and involved removing a lot of actuators. He said: "When we removed panels, we had to mark them because of the fasteners, one could be really long and the next one would be really short. When you removed a panel, you'd use a piece of cardboard, draw out the panel, place them in the order they were removed so you could drop each one right back in the same hole. With the F-14 you just loosened the fasteners and lifted the panel away. You didn't take the fasteners out, they stayed with the panel. Whoever thought of that was a brilliant person. We thought that was the greatest thing."



F-14B BuNo 163221/AA105 assigned to Fighter Squadron 74 (VF-74) 'Be-Devilers' at Marine Corps Air Station Yuma, Arizona in April 1994. The aircraft is painted with a two-tone grey colour scheme. Dan Stijovich

Plane Captain

Mike was amazed that F-14s did not have hydraulic leaks like the F-4s had, which significantly cut workload. During his time with VF-101 one of Mike's VF-74 colleagues was injured. He ran VF-74's flight line. Mike stood in for his injured colleague and worked on VF-101's flight line as a supervisor running the nightshift before qualifying as a plane captain. This allowed him to prepare the aircraft for flight, walk out with the crew, launch, and recover the jet, and make the post-flight inspection.

Explaining the pre-flight work, Mike said: "The plane captain had to check the aircraft was properly serviced with the correct level of hydraulic fluid. He inserted a pencil drain into a fuel cell to drain off a sample and check for water in the fuel. He also performed an aircraft walk-around to check nothing was loose, protruding or missing. Additionally, the plane captain ensured the aircraft was fuelled up, aircrew oxygen reservoirs were full, and the tyres were in operational condition. He was also responsible for the pilot, while the trainee took care of the RIO.

"As the pilot conducted his walk-around, the plane captain opened the small doors so the pilot could read the gauges showing the engine oil levels, and then closed them up. The plane captain then helped the pilot strap in, got off the aircraft, put the power on, put the hopper on to the aircraft and started the engines."

Stood-off from the aircraft with no communication, the plane captain signalled the pilot to lift the speed brake and checked it had deployed. He then kicked his foot to indicate he was going underneath the aircraft where he quickly moved between the two engines to check they were running, before inspecting the speed brake.

« **An aviation electronics technician cleans the intake of an F-14.** US National Archive/US Navy/PHAA Charles Thompson

A flight deck crew member with an SD-1D spotting dolly beside an F-14A Tomcat as the aircraft is readied for towing from a lowered elevator. US National Archive/ US Navy/ PH2 Leo Latasiewicz

A lot of responsibility to make sure the aircraft was okay, everybody was clear, and the aircraft got off in time.

Mike qualified with VF-101, returned to VF-74 and was selected by a board to be a plane captain.

Bad Ass Birds

Recalling bad aspects of maintaining the F-14, Mike instantly nominated a flap/slat lockout.

If the flaps and the slats got out of synch with each other they locked to prevent one side from dropping further than the other side and inducing a roll.

On the ship a flap/slat lockout was especially awkward because the wings were stuck in the forward position because the dropped flaps prevented the wings from being swept, Mike said it took a long time to get the flaps rigged back in and even with each other.

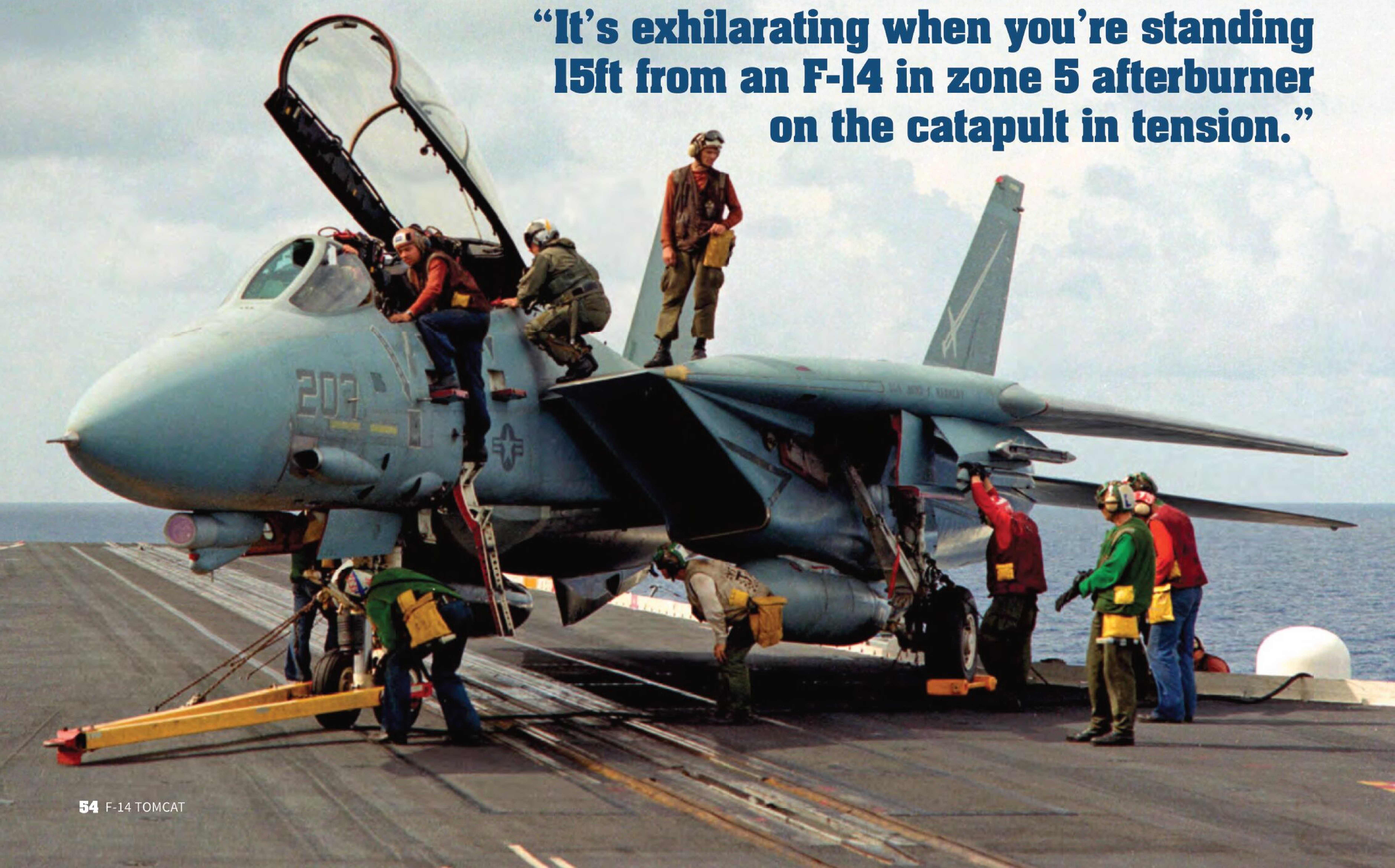
Between April and October 1984, Mike deployed with VF-74 on board the USS *Saratoga* as a night check supervisor running the line division and working with the flight deck crew as a qualified plane captain.

Unsurprisingly, he said operating a line on a carrier was like night and day compared to Oceana. Working on the flight deck at night was challenging. He said: “You had to worry about aircraft taxiing, constantly looking around to make sure you are out of the way, because the second you take it for granted you get the hurt. It’s exhilarating when you’re standing 15ft from an F-14 in zone 5 afterburner on the catapult in tension. That’s an experience you’ll never forget. Standing by the back of the aircraft, you could feel it sucking so much air that it’s pulling the air out of your lungs as the vibrations are coming up through your feet all the way through the top of your head. The level of vibration was absolutely insane.”

Mechanics were often time constrained when trying to fix or turn the aircraft for its next mission. When an aircraft landed with a problem and it was on the flight schedule to fly again, the maintenance department had to step in. The hook point fixed to the end of the stinger had to be changed after every tenth arrested landing. Bear in mind that a fully loaded 70,000lb aircraft was dependent on the tiny hook point to safely land. When a hook tip took its tenth wire, mechanics had to get it changed before it launched again. Similarly, the stinger was replaced after its 100th trap to avoid cracks forming within it.

This was an impossible job if the aircraft was backed over the side of the ship. Once the aircraft was moved forward, the mechanics had to work fast to get it changed and signed off. Not a difficult job according to Mike: “You had to loosen the cotter pin and pull it out. Take the castle nut off and pull the bolt out. Put the new bolt in, put the new castle nut on, tighten it down, and put a new cotter pin back in. The assembly had to be inspected.”

> **“It’s exhilarating when you’re standing 15ft from an F-14 in zone 5 afterburner on the catapult in tension.”**



Flight deck crewmen prepare to move a F-14 Tomcat. US National Archive/ US Navy/PHAN James Gallagher

« **Mechanics cover the canopy of an F-14 Tomcat with heat shields to keep sand from corroding the aircraft during the carrier's transit through the Suez Canal.** US National Archive/US Navy/PHAN Christopher Stoltz

Maintenance Issues on Cruise

Working to keep a dozen F-14A Tomcats serviceable on board the USS *Saratoga* held plenty of challenges. Mike maintains the biggest was a lack of parts, they were not readily available. He said: We had to rob parts from another aircraft to be able to meet our flight schedules. That just doubled our work. Also, the cannibalised aircraft had to fly every 90 days as did all of the squadron's aircraft. You could have an aircraft completely torn apart missing many of its parts. To get that aircraft airworthy we had to pull in a fully serviceable aircraft, park it next to the torn apart aircraft, take the required parts off the good aeroplane, put them on the cannibalised to make it airworthy and ready for its flight. In my opinion, that was a waste of time and money."

That was not the only challenge. Mike and his colleagues had to maintain a minimum 80% availability rate for its 12 aircraft fleet. Mike said: "If the rate went under 80%, the planning officer received phone calls asking why the aircraft were down, a challenge for the 250 sailors assigned to the maintenance department of a sea going squadron."

What is surprising is that when Mike ran the line, the only thing he ever did in the hangar bay was go down and ride the elevator with an aircraft back up to the flight deck.

When working on the flight deck, Mike worked from the line shack, located in a corner right next to catapult 1 and elevator 1. The maintenance department let Mike and his shipmates know what was going on via radio, and they paid close attention to the flight schedule.

Mike said there was one downside to the shack's location. There was no entrance into the ship from the line shack. He said: "To get to the shack from the flight deck, you had to go in front of the elevator, down to the catwalk and then back down to where our shack was. There was only one way back out. In foul weather we had no other place else to shelter in the ship. There was a scuttle, but it opened out on the admiral's passageway. We were not allowed in the passageway. During a storm, we would use the scuttle, looking around to make sure nobody was watching. As soon as our aircraft were launched, we went down to the shack."

Miramar

After the Saratoga deployment, in January 1985, Mike received orders to VF-124, the west coast F-14 training squadron based at Miramar.

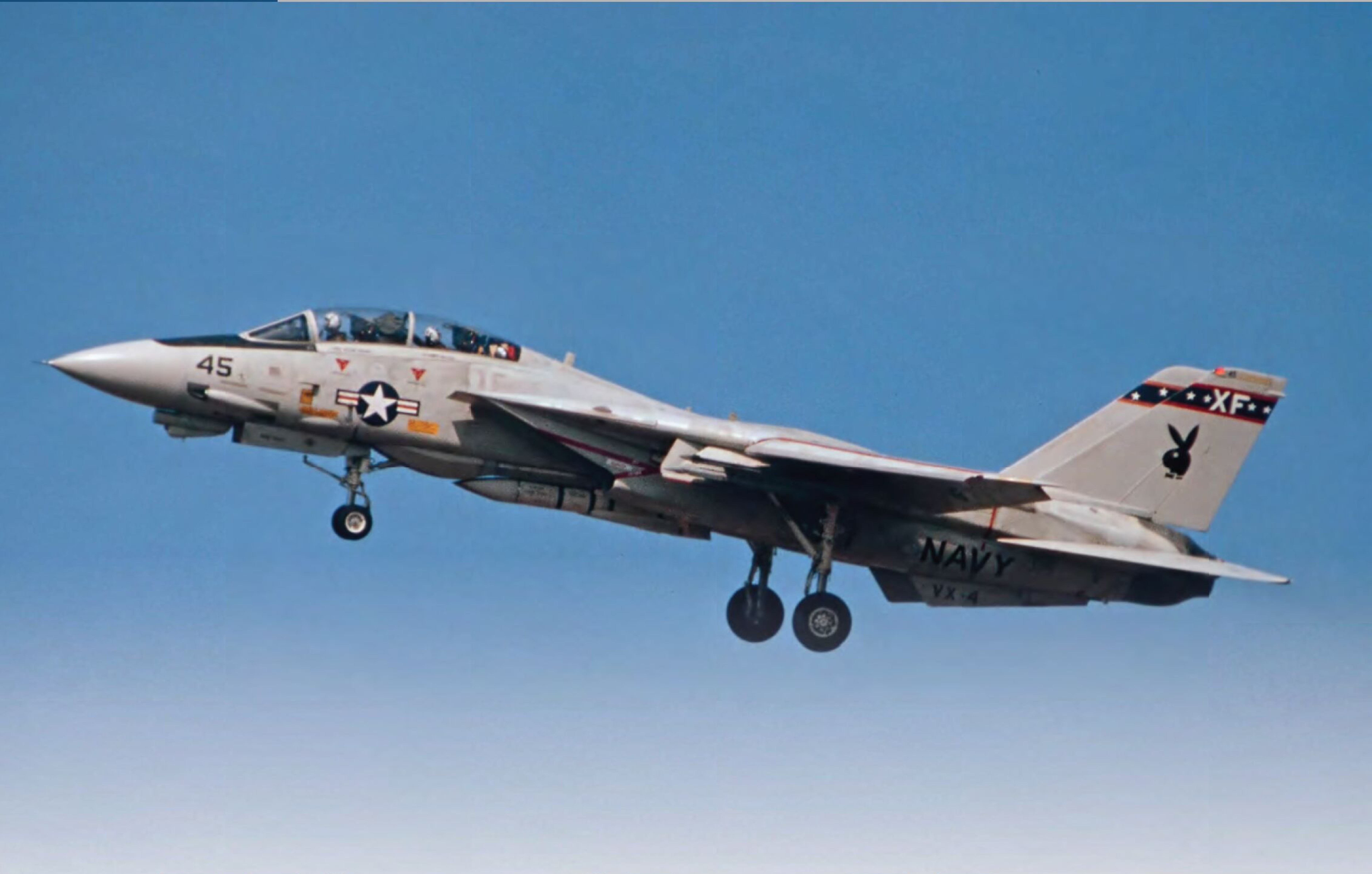
Shortly after Mike had checked in, an aircraft was grounded because the port side main gear would not lower, it was stuck. Mike got in the nose gear well to inspect a steel braided cable used to check if the landing gear had been blown. In the event of blown gear, the cable would be really loose. Mike checked the cable, and it was as taught as a guitar string. The gear was not blown down but lowering out of sequence. The doors were opening after the gear had started to drop and had snagged. When Mike went ahead and blew the gear it came down and was fine.

Mike found his workload on the training squadron to be much busier than on his operational unit, VF-74. At the time VF-124 had so few aircraft to fly. Its aircraft were old, and many could not fly to the ship anymore because they had reached their maximum number of arrested landings.

The small fleet was constantly breaking down and swapping parts got even worse, instead of having one cannibalised aircraft there were three or four. Whatever the number, they all had to fly within 90 days. A big workload for the maintenance department.

VF-124 was Mike's final tour. He left the Navy in February 1987 after nine years of service.

« **A plane captain steps from the cockpit of a F-14 Tomcat in the hangar bay.** US National Archive/US Navy/PHAN Zaengler



Missile Man

Weapons evaluation, tactical doctrine, reconnaissance and operating the Tomcat in Japan, big aspects of one pilot's career.

F-14A BuNo 159831/XF-45 was assigned to Air Test and Evaluation Squadron 4 (VX-4) 'Evaluators' in October 1985. The aircraft is seen at Naval Air Station Point Mugu. Dan Stijovich

LT PHIL Grandfield earned his Navy wings in 1979 and received orders to Fighter Squadron 21 (VF-21), one of four units still operating the F-4 Phantom. He surpassed 1,000 hours in the Phantom, transitioned to the Tomcat and flew more than 2,000 hours in the "Big Fighter".

Evaluators

Following his first tour flying Phantoms with VF-21, Phil joined Air Test and Evaluation Squadron 4 (VX-4) 'Evaluators' based at Naval Air Station Point Mugu, California. Once on board with the Evaluators, Phil transitioned to both the F-14 Tomcat and the F/A-18 Hornet at the same time. Pilots assigned to Navy operational test squadrons routinely qualify on multiple types in order to support the test mission. At the time, VX-4 was flight testing the AIM-54C Phoenix and AIM-9L Sidewinder missiles. Phil served as VX-4's operational test director for the AIM-9L.

On one of his early F-14 flights, the objective was to put captive carriage time on six AIM-54C Phoenix missiles, a heavy weapon payload, which taught him a great deal about the aircraft's performance.

In his time with VX-4, Phil launched one Phoenix on a short-range active radar shot, and two Sidewinders, one against an QF-86 Sabre target to determine the lethality of the missile's warhead.

Phil recalls that it was memorable watching a 1,000lb Phoenix missile coming off the aircraft but less so for the Sidewinders. The challenge was in getting the scenario set up co-speed with the target, at exactly the maximum range of the missile. It took a lot of practice and timing but Phil and his RIO got it right. The Sidewinder came off the aircraft, shot at maximum range and blew the QF-86's tail off.

STRIKE U

After tours serving on an air wing staff as the landing signal officer, VF-124, and VF-51, Phil went to the then Naval Strike Warfare Center, dubbed STRIKE U, at Naval Air Station Fallon, Nevada, and continued to fly both F-14s and F/A-18s.

The Fallon-based centre of excellence has undergone a couple of organisational changes since Phil served there. In July 1996, STRIKE U, the Navy Fighter Weapons School (TOPGUN) and the Carrier Airborne Early Warning

Weapons School (Top Dome) were consolidated into a single command and named the Naval Strike and Air Warfare Center, which was subsequently re-named the Naval Aviation Warfighting Development Center. Throughout, the centre of excellence has maintained the same role; to provide training, assessment, aviation requirements' recommendations, research and development priorities for integrated strike warfare, maritime and overland air superiority, strike fighter employment, airborne battle management, combat search and rescue, and close air support.

During Phil's time serving at STRIKE U, just like today, air wings deployed to Fallon to undertake combined training as a capstone event in their carrier work-up cycle; this of course, included F-14 Tomcats.

Recollecting his time at STRIKE U, Phil recalled flying the role of adversary against the air wing squadrons, but in general flying with the air wing squadrons to enable evaluation of their mission briefing, the tactics used and their debriefing processes. He said: "The air wing had to give a brief against the specific scenario given to them by STRIKE U staff. We evaluated how well they did based on the post-mission debriefs, who shot who, and if the air wing effectively met the mission objectives."

Phil really enjoyed his time at STRIKE U, he got to fly predominantly tactical missions every day and in a Tomcat!

Atsugi

At the end of his Fallon tour, Phil received orders to Fighter Squadron 154 (VF-154) 'Black Knights' based at Naval Air Facility Atsugi, Japan. Initially he served as the squadron executive officer and subsequently as the commanding officer.

In two and a half years, he completed four deployments to the Persian Gulf on board the USS *Independence* (CV 62) supporting Operation Southern Watch; monitoring and controlling airspace in southern and south-central Iraq.

For VF-154, this meant a lot of reconnaissance missions using the Tactical Airborne Reconnaissance Pod System or TARPS.

Phil's first Tomcat air-to-ground missions were flown with VF-154 employing bombs to strike active Iraqi surface-to-air missile sites in southern and south-central Iraq while patrolling the no fly zone.

But this was not Phil's first encounter with the Tomcat's air-to-ground role. During his tour with VF-124, he was the officer in charge of the Tomcat "Strike University", a small unit comprising former A-6 Intruder and F-4 Phantom crew with experience of dropping bombs. The unit wrote an air-to-ground element for the F-14 syllabus, added basic strike missions into the course, and provided training on delivery of dumb bombs; there were no targeting pods or smart bombs at this point. Years later, with the advent of laser-guided bombs and targeting pods, the F-14 became a very capable strike aircraft

TARPS

Phil enjoyed flying TARPS missions and explained how things worked. He said: "From high altitudes we could capture images from miles away, but most of the time we used the camera to look straight down, flying over targets at low altitude. In support of Southern Watch, we flew all over southern Iraq taking pictures. The Iraqis were not supposed to be manning anti-aircraft artillery and surface-to-air missile sites, so we took pictures of those sites all the time so that or image analysts could check for compliance."

Flying at low-level increases the threat level to the aircraft so the TARPS-equipped F-14 always flew with an escort aircraft so its crew could watch for threats.

Phil can't ever recall getting shot at during a TARPS mission down at 1,000 feet, but certainly never took the potential risk for granted and always flew fast.

In pre-mission planning, the crew was issued with a list of targets. Some were new, others were routinely taken so that the image analysts could look for changes.

The crew set a predetermined route from waypoint to waypoint. It was the pilot's job to fly that route and the RIO's job to operate the camera. In a great example of crew coordination, the pilot would call the camera-on and camera-off commands to the RIO, who called a response to confirm camera on and camera off. The RIO had no view finder for the TARPS system which meant reliance on accurately hitting the waypoints.

TARPS was equipped with three film cameras; one forward looking, one infrared, and a panning camera housed in its mid-section. With horizon to horizon capability, the panning camera was able to capture sequences of images for mapping large areas. Image analysts could arrange the sequence of images into mosaics of the route and the targets.

Post-mission, the crew attended a debrief to discuss what they'd seen with the analysts, usually changes at the target location.

Phil found TARPS missions interesting to both plan and fly. He said: "During Southern Watch, you could be at 30,000 feet and fly a race track, wait to see if something comes up. But on a TARPS mission, you're busy the whole time executing the plan, hitting the waypoints, looking to see if anybody is shooting at you. They were busy, interesting missions. I'd sign myself up for them every time I could. I liked them."

Demos

When Phil served with Fighter Squadron 51 (VF-51) at Miramar he was one of the Carrier Air Wing 15 demo pilots for the USS *Carl Vinson* (CVN 70). To open the air wing demo, Phil performed a supersonic fly-by of the ship. He said: "If you're going to perform a supersonic fly-by, and you're not supersonic, everybody is going to let you know about it, so you had to be sure you were supersonic!. I flew the demos with the air wing commander. The shockwave created when flying by the ship supersonically at 200 feet did damage every time. One time we popped the windshield out of a helicopter, and on another occasion, we cracked the windshield of an aircraft. I was supposed to be supersonic and it was all approved.

"Over-pressurisation caused the problems so they wanted to know we were performing, so they could open up the doors to equalise the pressure in the helicopters."

Flying that low, that fast requires a high level of focus. Explaining the set-up Phil said: "You start at 10,000 feet or so, light the afterburners, unload, and come down trying to level at 200 feet. As you level off at 200 feet, maybe a mile or so from the ship, the aircraft's very steady. It's not bobbling around and you're not fighting it to keep it there. You keep the afterburners in, and you don't want to climb, so you apply a little nose forward pressure to keep it from climbing, and then boom passed the ship and into a climb. Once the aircraft was flying in those parameters, 200 feet, Mach 1.1 or so, barely supersonic, it's quite stable and really comfortably to do. The ship flashes by and you just hope that you made a big boom."

Long-range Reconnaissance

Drive and determination got one young pilot into the Marine Corps, out of the Marine Corps and finally into Tomcats.

A section of VF-32 F-14As on their transit from a carrier to Iraqi airspace. Both aircraft are loaded with live AIM-7 Sparrow and AIM-9L Sidewinders. Hey Joe Parsons

Dave Parsons joined the US Marine Corps to fly the Tomcat. The US Marine Corps has never flown the Tomcat. At the time Dave enlisted, the Marine Corps was part of the Tomcat programme. He signed up to become a Marine officer and fly the mighty cat. However, when he was halfway through Officer Candidate School at Quantico, Virginia potentially soul destroying news reached him. The Marines had decided the Tomcat was too expensive and was having issues dropping bombs the Marine Corps way.

But Dave had committed to the Corps. He was commissioned as a Marine officer two years later and resigned himself to flying the F-4 Phantom. He then had to wait to attend flight school and ended up working at the Pentagon. During his time working in Arlington's largest building, he happened to meet some of the first Tomcat pilots from the fleet. He worked with the pilots for a year or so and that group of Navy officers heard Dave's desire to fly the Tomcat and helped change his life. They advised him to switch to the Navy and showed him how to do it. Dave was fortunate. He was able to change from 1st Lieutenant Dave Parsons, US Marine Corps to Lieutenant JG Dave Parsons, US Navy in no time at all, and got orders to flight school. Dave was back on the chase for Tomcat.

Dave's fortuitous nature held. After working exceptionally hard through flight training, he was first in his class, got his wings, got selected for the F-14 Tomcat, and chose to train on the east coast with VF-101 at Naval Air Station Oceana, Virginia.

He went through the course with pilots and RIOs from Fighter Squadron 33 (VF-33) 'Starfighters' and VF-102 'Diamondbacks', sister squadrons transitioning from F-4J Phantoms and bound for Carrier Air Wing 1. The junior RIO said it was a tremendous initiation to fleet ops.

Dave was destined to become a Diamondback. The squadron received its first Tomcats from Naval Air Depot Norfolk after rework and a system update. The F-14-equipped VF-102 had been designated a photo reconnaissance squadron, using the Tactical Aerial Reconnaissance Pod System dubbed TARPS. Continuing his fortuitous nature, Dave was selected as one member of the first east coast crew for TARPS training with VF-101. Dave helped develop the syllabus with Tomcat legend Joe 'Hoser' Satrapa.

The TARPS pod was huge. It weighed 2,000lb and was mounted to the fuselage underside. Aircraft integration required modification to re-route some electrical lines and cooling air provided by the environmental cooling system.

SWORDSMEN
NAVY
VF32
211
NAVY
VF32

VF-32's colourful CAG-bird F-14A BuNo 162701/AC200. Hey Joe Parson

Tail hook down, against the back drop of USS *America* (CV 66) below, a Diamond Back F-14A gleams in the sunlight. Hey Joe Parsons

At the time, only brand new aircraft were configured with the TARPS system. Three of VF-102's 12 allocated aircraft were brand new and configured with TARPS. Dave was one of eight officers trained on TARPS, providing four designated aircrews on VF-102; the only ones who could fly them.

When Dave and his pilot started TARPS training, VF-101 had two instructor aircrew qualified on the system, a pilot, and a RIO. The group worked through, verified the syllabus, and flew each of the required low-level flights several times over. They got certified and went to VF-102 in early 1982.

Ocean Safari 85

Dave deployed on the USS *America* (CV 66) for a seven-week cruise to the north Atlantic for Ocean Safari 85, an exercise to simulate the resupply of Europe and protection of convoy routes, and challenged NATO allies to find the carrier as it transited north to Vestfjord in Norway.

Underway in the Atlantic Ocean-Norwegian Sea area between Scotland, Iceland and Norway, USS *America* was in really bad weather. Sea state was so high, such that the bow of the ship was being buried in the waves. Dave had been to the north Atlantic on his initial deployment in 1982 for exercise Northern Wedding so he was a seasoned pilot by 1985.

On board, Dave and his VF-102 colleagues were maintaining alert, ready at any time to launch and intercept Soviet Badger and Bear bombers flying from their bases in the northern regions of the USSR, around the Kola peninsula, and toward the carrier's position.

The Soviets tried to track the carrier from its home waters of the Virginia Capes, where a Balzam-class intelligence collection ship shadowed the ship. Through deception and high speed tactics, the Balzam was lost on *America's* first night underway. More observers lay ahead in the shape of Soviet submarines and ships underway in the GIUK gap and aircraft prowling the skies. All searching for the 85,000-ton ship. NATO aircraft were also out looking for the ship as part of the exercise scenario and even the UK press was out to get the *America*, claiming that the ship would not arrive in UK-Norwegian waters without detection. The critique also extended to questioning if big deck carriers were outmoded and unable to operate in the modern battlespace. Secretary of the Navy, John Lehman was confident that USS *America* would prevail and joined the ship to host his doubting critics.

Using a deception plan, involving a second group of ships led by battleship USS *Iowa* (BB-61) sailing to the north of Iceland, the cover of night, very bad weather and heavy seas, USS *America* weaved through a cordon of Soviet ships in the GIUK gap by sailing close to Scottish shores, and began flight ops the following day.

Hey Joe Parsons

Additionally, USS *America's* flag plot (the admiral's tactical and navigational control room) was equipped with a new data link which fed all surface and airborne targets to a huge display helping the carrier to sail between the Soviet ships. Meanwhile, north of Iceland, USS *Iowa* played previously recorded carrier communications to deceive the Soviets that the *America* was in the area. According to Dave, the Soviets had no idea whether the *America* was up by Iceland, in the North Sea or in the English Channel.

However, the Soviets knew very well that USS *America* would launch its Tomcat squadrons to intercept their bombers. For the aircrews of VF-33 and VF-102, the initial intercept range from the carrier was 200 miles, then 500 miles and on a few occasions at 1,000 miles in several directions. These were known as Sly Fox missions designed to confuse both NATO and Soviet units alike. Anyone intent on locating the mother ship was bluffed. Soviet Tu-95 Bear-D surveillance aircraft were flying the length and breadth of the GIUK gap looking for the elusive Battle Group.

Dave launched from a position to the north of Ireland on a 1,200-mile roundtrip reconnaissance mission to photograph a Soviet Kynda-class cruiser underway in the English Channel.

He was part of a Navy strike group tasked to conduct a simulated strike on the cruiser. The group flew a route between Ireland and Scotland and planned to enter the west end of the English Channel. One-by-one, members of the strike group turned back. They had not received any satellite tipper information on the position of the Soviet ship and were running out of fuel.

Before Dave launched, he had spoken with a RAF Phantom navigator who was on board, and asked him where he could land to get gas? 'Lossiemouth'. With that in mind and despite the other group strikers turning back, Dave pressed on, determined to find the Soviet cruiser, and take photos of the ship. Dave was watching gas constantly and figured he had 15 minutes search time before diverting for fuel.

When Dave and his pilot entered the English Channel, visibility was like pea soup. Radar was the only way to find the Soviet cruiser. There were hundreds of contacts on the pulse radar scope which were mainly fishing vessels and merchant ships. Dave picked out the largest contacts and directed the pilot towards them. After 15 minutes, fuel was critical, but they decided to check out a set of radar blips that looked like a military formation.

As they closed on the lead ship still obscured by fog, they were finally able to discern the characteristic superstructure of a large warship with red orange decks that typified the Soviet Navy. Success!

Dave directed his pilot to put the wings back, fly fast at 1,000ft and approach the cruiser head-on with the cameras running. As they passed overhead, he noticed the ship's company was at quarters being addressed, almost certainly by the Russian admiral known to be on board. After passing the cruiser the pilot made a tight turn, and flew a 45° offset to capture standard reconnaissance photographs of the antennas. As they returned overhead, quarters had been interrupted, the ship's company was running to action stations, and the pilot rigged him one more time and pulled up above the cruiser levelling off at 10,000ft and set course directly for the carrier. Suddenly the Soviet cruiser lit the Tomcat up with its systems and the crew was grateful that the sailors hadn't been ready.

Flying the shortest route back over the UK, as the Navy Tomcat approached RAF Lossiemouth, the crew heard an E-2 calling their radio call sign. It was barely readable, but Dave called back and after a few calls back and forth, established radio comms. The E-2 advised that a KA-6D tanker was on its way and directed to report back once tanking was complete. With tanking complete Dave called the E-2 only to be asked of his aircraft's weapons status. He reported a constructive loadout, code for what the Tomcat could theoretically carry.

The E-2 called one zero delta, which meant the 200-mile point and right in front of the Tomcat. While proceeding to station, Dave acquired and identified multiple contacts on the nose; a Victor tanker with four Phantoms. The E-2 called a red and free weapon status. The pilot rolled in behind the formation of RAF aircraft and they broke every which way. The Tomcat crew had scalped all five.

Then the Tomcat crew spotted an unusual P-3 Orion westbound towards the carrier, which the E-2 called as hostile. Dave's pilot rolled the Tomcat in and gunned the turboprop.

F-14D BuNo 163227/AB103 of VF-102 loaded with an AAQ-14 LANTIRN pod prepares to enter the landing pattern of the USS *John F Kennedy* (CV 67) following a mission in support of Operation Southern Watch. US National Archives/ US Navy

“Who wouldn’t be friendly with a Tomcat that could shoot you down, flying on your wing.”

Another encounter followed soon after with an Air Force RF-4C Phantom. The Tomcat pilot followed the jet, locked it up and got a ‘fatal shot’ on the Phantom when its pilot executed a break turn. Dave and the pilot then got called back to the carrier.

Invited to the Admiral’s spaces to meet the Secretary of the Navy, Dave had the opportunity to ask Lehman if he had been worried that the Tomcat was gone for so long. Lehman replied: “We knew you had found the Kynda. When they lit you up, all our warning gear went off. When they called their headquarters to report an overflight by a Tomcat, they argued it was impossible.”

Indian Ocean

On his second deployment, Dave was flying longer missions in the pea soup Monsoon weather of the Indian Ocean, saving fuel, and making it back to the ship at the allocated time.

Dave explained: “We gave ourselves a little fudge factor and then built a fuel ladder on our kneeboard. We drew a picture of a ladder and used 15-minute increments to write down the time hacks from the cat shot to the trap. We calculated the max trap on the ball, usually about 5,000lb of gas, and worked back through the mission using an expected fuel burn of 1,100lb every 15 minutes. We could look at the ladder at any given time during the mission and know if you were above or below the fuel requirement. We never wanted to be below the ladder because we never wanted to ask for gas.

“That got drilled into us from day one. If you saved some gas you could bring your throttles up at the end of the sortie. We called it "hanging on the blades", bringing your throttles back so that you were flying at the most efficient air speed with the least amount of fuel flow. For a combat air patrol that’s fine because your missiles would do all your work.

You just needed to be able to remain airborne as long as possible. For the defence of the carrier against possible Soviet cruise missile carrying bombers, we called this setting the grid. Picture the carrier at the base of your hand. All of the Tomcat CAP stations were at the ends of your fingers. You'd place your hand across your threat sector and position Tomcats 200, 150, and 100 miles out from the ship. A grid of Tomcats. As they needed gas, KA-6D tankers came out to air refuel them.

"We expected enough warning of a Soviet launch to set the grid and get the Tomcats launched. We wanted to be able to track the Soviet bombers from as far away from the ship as was possible."

Tomcats positioned at 200 miles could see a long way out with the AWG-9 radar, which acquired precise range, altitudes and directions of each contact. The tracks were passed back to the E-2 and the ship via a Link 4 data link. It was a silent transmission which enabled the carrier to remain entirely EMCON (emission control) with all of its emitters shut down.

The Tomcat was the first fighter in the world to have a radar with the ability to track multiple targets (24) and create a weapon solution on all of them, for as many of the missiles carried by the aircraft at the time. The AWG-9 system had a huge radar display with a range scale out to 250 miles.

In the case of the AIM-54 Phoenix, the AWG-9 automatically assigned priority to targets which the RIO could accept or modify. Once a target was detected, the radar displayed crucial bearing, range, altitude, speed and heading with the RIO reporting these parameters in a regular cadence to the pilot and directing aircraft heading, speed and altitude changes to optimize the intercept. This was the bread and butter of the RIO.

On the same cruise, when USS America arrived on station south of Oman, VF-102's new intel officer told aircrew to expect an Iranian P-3 to approach them daily to take a look at the ships within the area of interest to them. Tomcats would be launched to intercept and escort them until they departed the area.

Using a black and white image of an Iranian P-3, VF-102's intelligence officer showed the image at a briefing. Someone asked what colour the P-3s were painted and the intel officer said they were painted in a desert colour scheme. Dave disagreed and suggested Iranian P-3s were painted in shades of blue. He knew he was correct because an image of an Iranian P-3 at Lockheed Burbank appeared in the edition of *Air Enthusiast* which Dave had in his state room.

When Dave showed the image to the intel officer, he looked at it in horror, dismissing it as hearsay and citing reasons given to him during his highly-effective DoD training.

Subsequently, Dave was in an alert jet and it got called to launch. Within five minutes two Tomcats were airborne. Rules deemed the first aircraft to arrive on scene joined up while the second stayed 5,000ft above to look out for Iranian fighters.

Fortuitously or not, Dave knew the other Tomcat pilot from the sister squadron was a former helicopter pilot, and a very rule conscious person. Unfortunately, the sister squadron launched first but Dave could see him on his radar flying to a 50-mile buffer on Oman. This was not relevant to the situation. The international buffer was just 12 miles. Dave discussed the situation with his junior pilot reminding him of the facts of a hot intercept. Dave's pilot then cut the corner of their route and ended up in front of the skipper, not that the crew noticed them pass. The other Tomcat crew only realised when Dave identified the Iranian P-3. Nothing was said but Dave's jet joined on the P-3 painted in shades of blue allowing Dave to shoot some colour images with his own camera. The P-3 crew held up some signs and conducted the intercept in a friendly way. As Dave said: "Who wouldn't be friendly with a Tomcat that could shoot you down, flying on your wing."

When Dave got the photographs developed, he enjoyed showing the results to the squadron intel officer.

« A VF-102 F-14A in the vertical loaded with six inert AIM-54 missiles for a photo shoot.
Hey Joe Parsons

F-14 Tomcat Association Reunion
April 29 - May 2, 2021 - Long Island, NY
Celebrating the 50th Anniversary of the F-14's First Flight

Join our virtual event celebrating the 50th Anniversary of the F-14's first flight on December 21st, 2020!
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TARPS Specialist

A desire to follow in his father's footsteps put **Ward Carroll** on the runway to becoming an F-14 RIO and an air wing operations officer.

F-14A BuNo 160900/AC206 of Fighter Squadron 32 (VF-32) seen at Naval Air Station Miramar, California in January 1992.
Dan Stijovich

It's easy to understand Ward Carroll's drive to be a fighter pilot. His father served with the US Marine Corp flying A-4 Skyhawks during the Vietnam War. Hoping to follow in his father's footsteps, Ward was selected for the Naval Academy at Annapolis, Maryland but during his tenure, he learned that his vision was not 20/20. That ruled him out from being a pilot, so he trained to be a Naval Flight Officer.

From the moment Ward started flight school with Training Squadron 10 (VT-10) 'Wildcats' at Pensacola, he was motivated to get F-14 and become a radar intercept officer. Ward achieved high grades, and proved to be a very capable operator, he loved high G manoeuvring and was selected for the F-14, receiving orders to VF-101 at Oceana, Virginia.

Ward was in a class of seven, all of whom were Cat 1 graduates and academy classmates; it was a tight knit group. Ward says that the instructors built on that camaraderie which made his F-14 course a great experience.

When Ward graduated from his course in 1984, the Tomcat was purely a fighter aircraft used for fleet defence. Aircrews constantly trained to run intercepts and escorts, dogfight and shoot the Phoenix missile, all in a battlespace saturation with jamming. The threat faced came from the Soviet Union, so the training had to be realistic and robust to counter the threats posed by the Soviets. That said, the aircraft also had a secondary reconnaissance role using the Tactical Air Reconnaissance Pod System, dubbed TARPS.

Swordsman

Because Ward came top of his RIO class, he was drafted to deploy straightaway with Fighter Squadron 32 (VF-32) 'Swordsmen', a TARPS-equipped unit assigned to Carrier Air Wing 6 on board the USS *Independence*. And, before leaving VF-101, Ward underwent additional training to learn the TARPS system.

There is a Navy line that says when you get to the fleet you know about 25% of what you need to know. In Ward's case that was true. As a RIO he had never had a carrier catapult launch or an arrested landing.

Explaining, Ward said: "My first carrier launch and landing was aboard the *Independence* on deployment. That was a real eye-opener. The F-14 was a big aircraft, so the catapult shot was quite a jolt. The aircraft weighed something between 67 and 70 thousand pounds, which are numbers unheard of in today's air wing. That's a lot of aircraft to get airborne. The A-model would go into afterburner at the heavier weights. You'd start in [afterburner] zone two and as the cat shot happened, the pilot would go from two to five. By the time you get to the end of the stroke, you'd be at full afterburner. That was exciting."

The *Independence* proceeded through the Mediterranean, the Suez Canal and into the North Arabian Sea. On station, the air wing participated in an edition of Exercise Beacon Flash staged several times each year with the Sultan of Oman Air Force (RAFO). The exercise objective was to increase the readiness of the carrier battle group by training in air-to-air combat with dissimilar types, RAFO Jaguars and Hunters, air-to-ground strike training, air defence, and command and control. At the time, the exercise was rated by Navy commanders as the best training available to a carrier battle group while on station in the northern Arabian Sea.

Ward described the operations as amazing ones that involved dogfighting over the desert, and low-level flying through canyons.

Ward and his air wing colleagues also had to face the real world threats posed by Iran. F-14s would launch to intercept and escort Iranian aircraft, mostly P-3 Orion maritime patrol aircraft, intent on overflying the carrier. He said: “We wanted a Tomcat to be in the field of view any time the Iranian crews tried to take pictures of the carrier. It was exciting to intercept at long range and then escort an Iranian aircraft.

At that time, the idea of taking a carrier into the Gulf was unheard of because it was deemed too risky to go through the Strait of Hormuz. Carriers only started entering the Gulf with Operation Desert Storm. Today it is a standard operation.

Ward said the Independence remained on station off Karachi, Pakistan and Bandar Abbas, Iran. Their task to oversee what Iranian forces were doing with their patrol boats, for example harassing shipping, and flying long-range intercepts of their maritime patrol aircraft.

Ward also recalled the occasional Soviet aircraft passing through the area. “There were big An-22 transport aircraft lumbering through from Karachi towards the Horn of Africa. It was fun to see them. We’d wave and hold up Playboy magazine. On one occasion we wore a Ronald Reagan mask for their photos. It was fun, nothing intense, a salute from one military professional to another. Détente in the air.

“In the Mediterranean, we played cat and mouse with other Soviet cruisers, destroyers and submarines. Their ships would tail us, and the carrier’s crew would try to lose them overnight. The Soviets also used intel ships. They looked like trawlers but were fitted with antennas all over. They too trailed the carrier.”

Invitation to Join

After his VF-32 tour, Ward’s Navy career took an unorthodox path. He was appointed editor of *Approach* magazine at the Naval Safety Center during which he flew with the aggressor squadron at Oceana. Back seat rides in TA-4s, F-5s, and F-16s came Ward’s way. As a function of the aircrew network he created during his editorial tour, Ward was asked to join Fighter Squadron 143 (VF-143) ‘Pukin Dogs’ for a Cat 2 super JO tour (JO denoting junior officer). This enabled him to avoid a tour serving with a ship’s company, which kept him flying.

At the time, VF-143 was operating brand new F-14A-plus (later re-designated F-14B) aircraft, powered by very powerful GE F110 engines and deployed on board the USS *Eisenhower* (CVN 69), his first nuclear carrier assignment.

‘Ike’s’ deployment between September 1991 and April 1992, took in the Mediterranean, the Gulf, back to the Med and finally an additional two-week period in the north Atlantic to participate in Exercise Northern Wedding.

Seas were quite angry, which presented pilots with challenging conditions for landing back on the aircraft carrier. According to Ward, he watched waves break over the bow on the ready room TV, and rated it the scariest flying he’s ever done, bar none.

Once Ike sailed into the Norwegian fjords the water was calmer. This enabled the Tomcats to mask against the land mass around the fjord, hiding from the radars of Soviet Badger and Bear bombers. Not only that, but when the Tomcat aircrews returned to the carrier, they held over land, only returning over water immediately before landing. On the transit back to the United States, toward the end of his third deployment, Ward became a blue nose, a term used to denote that an aviator had flown above the Arctic circle.

“We’d wave and hold up Playboy magazine. On one occasion we wore a Ronald Reagan mask for their photos.”

Hey Joe Parson

A VF-32 F-14A Tomcat based aboard USS *John F Kennedy* (CV 67) flies with a Royal Air Force Phantom FGR2 during Operation Desert Shield in December 1990.
Hey Joe Parson

Dumb and Smart Bombs

Following his time at VF-143, Ward returned to VF-101 to serve an instructor tour. At the time, the F-14 only had a rudimentary air-to-ground capability, the type was capable of dropping dumb bombs, but not very accurately. However, RIO instructors at VF-101 were getting smart at weapon delivery profiles, high and low pop-ups. At the time, the RIO's job involved calling out climb angles, dive angles, air speeds, altitudes, helping the pilot with the cues while he was trying to decipher the symbology in the HUD. The F-14's HUD was not as user friendly as the Hornet's. It featured all kinds of detail but suffered from less than accurate presentation. That said, pilots had figured out how to correct for wind, and were good at it, and Ward was kept busy instructing the procedures during his time at VF-101.

Bosnia

In 1995-1996, the then Lieutenant Commander Ward served with Fighter Squadron 102 (VF-102) as part of Carrier Air Wing 1 on board the USS *America* (CV-66). It was *America's* final deployment which included operating on station in the Adriatic Sea in support of NATO Operation Deliberate Force.

For VF-102, involvement in Deliberate Force meant flying a lot of missions supporting the Hornets which were striking targets in and around Sarajevo for the first two weeks of the carrier being on station. In many scenarios the primary role was to employ TARPS to shoot imagery of activity by the Bosnian Serb Army. Once a peace agreement was brokered, VF-102 flew TARPS missions around Bosnia to find gravesites, to observe where Serbian forces were moving, and support Implementation Force troops who had divided the country into four quadrants.

Ward recalled the high demand for TARPS imagery from ground commanders and those at Aviano Air Base, Italy. Explaining, Ward said: "Missions varied based on the threat envelope and the nature of the tasking. Sometimes the ground commanders needed a higher spot size, other times high resolution. We dropped below 10,000ft on a couple of occasions to acquire the tasking requirements, but only for short periods of time. Commanders did not want us to get shot down and end up requiring rescue. Generally, we'd stay above 10,000ft to remain outside the engagement zones of SA-6 missiles and shoulder-fired MANPADs.

"The missions were sporty. Flying fast, you'd hit a turn point, look down and see shells exploding. It struck that you were flying over a war zone and people were dying beneath me. A real eye-opener. We didn't go feet dry [overland] at night, but remained over the Adriatic, but we could see explosions inland. A really dramatic scene."

Operations Officer

Ward's next duty was operations officer with Carrier Air Wing 1 on board the USS *George Washington* (CVN-73). By then, the F-14 was cleared to operate the LANTIRN pod which was included in all of the air wing's strike planning and contingency operations. *Washington's* 1997-1998 cruise took the ship through the Mediterranean and on to the Gulf for Operation Southern Watch, patrolling the no fly zone.

Despite occasional activity from Iraqi surface-to-air missile sites, which always shut down once an EA-6B Prowler targeted the radar, the highest priority mission flown by Tomcats was to protect high-flying U-2 intelligence gathering aircraft. U-2s were flying under the UN banner capturing imagery and other

A F-14A Tomcat launched from the flight deck of the USS *John F Kennedy* (CV 67) during FLEETEX 1-90.
US National Archive/US Navy/PH1 Michael Flynn

intelligence data as evidence that the Iraqis were honouring the terms of the post-Desert Storm agreement. According to Ward, every once in a while, US theatre commanders were concerned that an Iraqi MiG-25 would try to shoot down a U-2. The trigonometry involved in providing that protection was quite tricky for the Tomcat crews and it was the primary concern during no fly zone operations.

At one point during the *Washington's* on station time in the Gulf there were three other carriers also underway, including one from the Royal Navy. "That's too many," said Ward, "de-conflicting traffic patterns was quite the trick. You'd be more likely to have a mid-air with another aircraft from a different air wing than you were to see combat against the Iraqis. Tanking was also perilous. You'd have ten aircraft on each wing of a tanker while air refuelling on their way to southern Iraq for Operation Southern Watch. A Marine Corps squadron's executive officer was killed in a mid-air while leaving the tanker during a night-time mission. Tanking was the most dangerous part of doing the no fly zone."

LANTIRN

Between 1994 and 1995, an F-14 pilot serving with the then Naval Fighter Weapons School proposed equipping the F-14 with the AAQ-14 LANTIRN targeting pod to increase its air-to-ground capability.

Supported by staff serving with the Fighter Wing Atlantic at Oceana, a team of experts devised how to integrate a LANTIRN pod on an under fuselage weapon station, normally used for an AIM-7 Sparrow or an AIM-54 Phoenix missile. Digital architecture required to run the LANTIRN pod and a new tactical information display were also successfully integrated. Additionally, the original round scope in the aft cockpit, dubbed the fish bowl, was replaced by a programmable tactical information display. Ward described the new display as a beautiful piece of gear that helped the RIO manage the higher work load brought about with the advent of a greater air-to-ground role.

Ward rated the LANTIRN pod's resolution as being very high and considers it to be the system that turned the Tomcat into a lethal precision bomber.

This changed just about everything in terms of an air wing's mission planning strike lead selection.

Always dismissive of the F-14 as a strike platform, when LANTIRN pods arrived in fleet squadrons, the Hornet community soon realised the F-14 was now an accurate bomber and dubbed it the Bombcat. During combat operations, LANTIRN-equipped Tomcats were always tasked for strikes requiring precise targeting.

US National Archive/US Navy/Lt Cdr Leenhouts

In Operation Iraqi Freedom, the Tomcat became the Navy's aircraft of choice for the air-to-ground role, demonstrating its versatility as a very manoeuvrable, very fast aircraft with long legs. At one point in Operation Iraqi Freedom, some Tomcats were flown ashore and based there to generate sorties even faster.

Sentiments

Reflecting on the F-14 Tomcat, Ward considers the aircraft to be a one of a kind, one that got more lethal and safer as it got older. Ward said he feels blessed to have flown Tomcats and will go to his grave, very proud of the time that he served in the cockpit of the F-14.

Concluding, he said: "It's a muscle car. Neither the Super Hornet nor the F-35C are as fast as the F-14. That's a metric that all of fighter aviation punted on, so the idea of being able to nibble at Mach 2 is no longer a consideration. The calculus has changed. The Navy is happy that you can barely fly supersonically, but they concerned about having lethality and stealth.

"The kerb appeal of the F-14 was its looks. Sitting on the ramp, it always looked mean, but elegant too. To compare a Super Hornet and especially an F-35 to the Tomcat is like comparing a Camaro to a Toyota. You can point to a Toyota and wax lyrical about its better gas mileage, and you can point at the Camaro and feel happy by the way it looks."

A section of Pukin Dog Tomcats. US National Archive/ US Navy

"Neither the Super Hornet nor the F-35C are as fast as the F-14."

The Interceptor

In October 1985, four Tomcats launched from the USS *Saratoga* to carry out a lights-out intercept of a civil Boeing 737. They made the headlines.

Lt Cdr Larry Neal reported to Fighter Squadron (VF-103) 'Sluggers' in the summer of 1983 having completed F-14A training with VF-101 at NAS Oceana.

Larry's first F-14 deployment with VF-103 on board the USS Saratoga (CV 60) ran from April to October 1984 and was affectionately known a "Love Boat" cruise since little of significance other than liberty port visits occurred.

His second deployment started in late August 1985 on board the USS *Saratoga* (CV 60), one that had more than a notable mission in store for Larry.

A Tomcat Mission

The *Saratoga* was conducting routine flight operations in the Adriatic Sea and heading to Dubrovnik for a liberty port visit when the ship received notification that an Italian cruise ship the MS *Achille Lauro* had been hijacked with Americans on board. The US government sought to find the ship and stage a rescue mission.

TARPS-equipped F-14s were launched to locate the ship and maintaining stand-off range, the aircrews took imagery intended for planning the rescue mission.

At the time, rescue forces were in Cyprus but were planned to embark the carrier, then leapfrog to the *Achille Lauro*.

The Tomcat aircrews got the images required for planning a rescue but then, the hijackers took the ship to Alexandria in Egypt, disembarked on an Egyptian tugboat, landed ashore and disappeared. Consequently, the rescue mission was cancelled, and the *Saratoga* once gain headed toward Dubrovnik.

On board, F-14s were placed on 'Alert 60', a posture used as the carrier approached a port.

VF-103 F-14B BuNo 161873/AA102 seen at Marine Corps Station Yuma, Arizona in 1997. When Larry Neal served with VF-103 in 1985, the squadron was called the Sluggers. In 1995, VF-84 the 'Jolly Rogers' was dis-established, and its name was transferred to VF-103. Hence the jet is marked with Jolly Roger tail markings. Dan Stijovich

But that wasn't the end of the story.

According to VF-103's website, on October 10, the squadron received orders to intercept an EgyptAir Boeing 737 airliner with hijackers on board. Specifically, the four men representing the Palestine Liberation Front who had hijacked the MS *Achille Lauro* off the coast of Egypt three days earlier.

At 7 o'clock in the evening, Larry was sitting in his state room watching TV with his roommate when the ship made an announcement declaring the four alert F-14s and the alert E-2 were launching.

Taking up the story, Larry said: "We called the ready room and spoke to the duty officer. What's going on"?

"Get down here right away, we're launching aeroplanes."

"What are we doing?"

"We don't know."

"Once we were in our squadron's ready room, the duty officer told us to get suited up, get to the flight deck, and get ready to launch."

On the flight deck Larry climbed into the cockpit. The E-2 and KA-6 tankers were already launching in less than 20 minutes, from a 60-minute alert status.

Then, as Larry was buckling up, a junior officer approached the cockpit and said: "Larry all we know is you're looking for a civilian airliner and you may be cleared to fire."

Larry looked at him, "say that again, really slowly?"

He said: "You're looking for a civilian airliner and you may be cleared to fire."

"Okay" replied Larry.

The JO got down off the aircraft, stowed the ladder, Larry closed the canopy, started up and launched.

Taking off at 7.30pm, Larry was the second F-14 to launch. He didn't know what his mission objective was but climbed into the overhead to refuel.

Positioned southeast of Crete, the four VF-103 Tomcats were placed on two CAP stations, one at the eastern end of Crete, the other off the western end. There was no moon, it was really dark, and the crews were on station, just waiting.

Then things started to happen. The eastern station got a call of an unknown bogie at 45 to 50 miles to the east. As the Tomcats got close, the aircrews realised the bogey had no lights switched on but conducted the entire intercept off the radar which was unusual. The RIO had to use a flashlight to identify the type of aircraft. The moment he counted a second engine on the left side, the ship immediately confirmed it was not the objective and to return to station. That was all the ship said.

Larry described the situation as spooky; no one knew what was happening, everyone was midnight (flying with their lights off) with unknown aircraft airborne to the east.

Then a destroyer positioned to the south of Crete had tracked a target originating from Egypt. A Tomcat on the east station was vectored to intercept, identified the aircraft,

US National Archives/US Navy/ PH1 Michael Flynn

"Once we were in our squadron's ready room, the duty officer told us to get suited up, get to the flight deck, and get ready to launch."

relayed its registration number to the ship and described the emblem on the tail. It was an EgyptAir aircraft. Confirmation of the objective came back immediately, with the question, can you see what's going on inside?

Larry said: "The F-14 pilot had his lights off. No one on board the airliner knew he was there. He crept up as close as he dared and started looking through the windows. Flight attendants and people were walking around. One person looked out right at him, so he ducked below the wing, attempting to get out of sight. Waits a minute and climbs back alongside. The blind of the window where the person had looked out from, had closed.

"The pilot had no idea there were two F-14s escorting his aircraft."

As the 737 flew westbound to the south of Crete, Larry and his wingman joined the formation. Four F-14s, all lights out, and the 737 pilot didn't know they were there.

The mission commander on the E-2 started talking to the 737 pilot on VHF and said: "This is the United States Navy. You're surrounded by F-14s. We want you to proceed directly to Naval Air Station Sigonella on the Island of Sicily."

A conversation ensued and the mission commander repeated: "You're surrounded by F-14s. You need to go to Sigonella."

The 737 pilot responded: "There is nobody outside. I'm looking right now. There are no aeroplanes around me."

"So, the mission commander on the E-2 calls us on UHF, said Larry. "He said: 'Turn your lights on'. We flick our lights on. The F-14 at night is a lightshow.

"The mission commander said 'Okay, guys, you have his attention. Back off a little because you made him a little nervous'.

"Negotiations started. The 737 pilot tried a couple of excuses but finally agreed to go to Sigonella.

"Without a flight plan, we were denied permission to enter the Rome FIR. Despite discussion, the Italian air traffic controller would not back down, said it was not approved. Then one of the RIOs declared emergency fuel which got their attention, and we were cleared to Sigonella. After two failed attempts, the pilot lands on his third attempt."

None of the F-14s landed at Sigonella that night but headed back to the *Saratoga* 300 miles away, but the aircrews still did not know what they had done, other than complete the mission as called for. Back on the flight deck, Larry's plane captain told him he had helped capture the hijackers of the *Achille Lauro.*

President Reagan said of the VF-103 aircrew: "These young Americans sent a message to terrorists everywhere. The message - you can run but you can't hide." When asked if he was prepared to shoot down the plane carrying the hijackers, Reagan said, "That's for them to go to bed every night wondering."

Variable Geometry Wings

Discussing the Tomcat's variable geometry wings and what the system was like for the pilot Larry said: "The variable geometry was driven by the Central Air Data Computer and moved the wing to its required sweep. It was a really reliable system."

Like any supersonic aircraft, as the F-14 decelerated through Mach, the flight controls became more effective as the shockwave came back forward again such that the aircraft tended to dig in, a condition called transonic pitch up. An F-14 pilot could feel more stick authority as the aircraft slowed down, but it rolled so quickly with the wings aft that control limiters were installed so that the fuselage would not be over-torqued.

"These young Americans sent a message to terrorists everywhere. The message - you can run but you can't hide."

US National Archives/US Navy

US National Archives/ US Navy/PH3 Dwain Willis

On and Off the Boat

Larry had just completed the Navy's NFO-pilot transition programme when he transitioned to the F-14. His previous fleet experience amounted to 1,000 hours and 200-plus traps in the F-4J Phantom, but as a backseater, obviously a very different role. So Larry joined VF-103 as a "nugget" pilot, a new guy. Looking back at his transition, he remembers vividly how hard he had to work to get ready for his first F-14 carrier landing. Years later, he remarked that no matter how many times you land on the carrier, the excitement and intense focus required never changed.

He said: "When you're in the cockpit on final, you're flying the meatball, correcting line up, and controlling angle of attack. Those are your only focus and to remember to keep the power up and only make small power corrections. You don't really think about the fact you're flying an F-14 weighing 50,000lb. It just was, what it was.

"There were three specific characteristics that made it sporting some days, to bring it aboard. It had the largest hook-to-eye distance of any operational carrier-borne aircraft at the time. That meant you were way higher than your hook, so as the aircraft got lower, the hook was even closer to the ramp. Also, the Tomcat had big straight wings which tended to float, so we used a thumbwheel on the stick for direct lift control to help us control that float if we needed to. Lastly, the original F-14A powered by TF30 turbofan engines had a very slow spool time. If you required more power, you faced a small delay due to the slow spool time. All three characteristics made it a difficult aircraft to land on the carrier. You knew they existed. They weren't a surprise, so you just had to handle it in certain way to be successful.

"The catapult launch on the other hand was one of the things that was totally out of your control. The catapult crew direct you to kneel the aircraft, put you into the box and in the tension. The catapult officer shows you flashing fingers for you to select burners, you check your instruments, wipe it out and give the cat officer a salute. Then, for the next two and a half seconds, you're in the hands of the gods, there really is nothing you can do. You come off the end and the aircraft's flying.

"Short of an engine malfunction, the power off the deck never presented a problem with sink, you got airborne and were flying. When the aircraft came off the cat, the back end dropped caused by the push up of the nose gear, which extended the airflow over the stab and the trim. You assume a flying attitude of about 10 degrees, do a clearing turn and fly off. With both motors turning, there was lots of power and was never an issue."

Larry flew a TARPS mission from the Red Sea to the Cape of Good Hope in Madagascar to drop in on a Soviet Destroyer. It required a lot of fuel, two or three times to the tanker going out, and once again on the way back. Generally, TARPS missions presented a certain set of issues, primarily meeting the required photographic parameters and the additional risks of flying low-level.

US National Archives/US Navy/ PH1 Michael Flynn

Hi Roller

Some people have to switch their life goals through no fault of their own. This is a tale of one individual that did just that.

▲ **F-14s regularly deployed to Marine Corps Air Station Yuma, Arizona to conduct live weapon drops on the nearby ranges. F-14A BuNo 160891/AJ205 assigned to VF-14 is seen on take-off from the base in April 1996, loaded with two 1,000lb bombs.** Dan Stijovich

Larry Coy was a late comer to the Navy. He was commissioned two weeks before his 27th birthday. The reason for his late career choice was that despite a desire to fly jets, Larry was originally pursuing another dream, training as a track and field athlete for the 1980 Moscow Olympics. When President Jimmy Carter boycotted the games in response to the Soviet invasion of Afghanistan, after years of training, Larry was pretty fed up. But he switched dreams and applied to join the US Navy.

When he joined the Navy's Aviation Officer Candidate School there were 68 in the class. According to Larry the course leader asked, 'who wants to fly jets?' And all 68 raised their hand. Then he asked, 'who wants to fly the F-14?' and again, all 68 said 'me'. But it turned out Larry was the only one of the 68 to make it to F-14s. He graduated in first position.

Larry likes what he likes in life, a fact clearly demonstrated by his election to fly North American T-28 Trojans in training rather than Beechcraft T-34 Mentors. He chose to fly Trojans, simply because he considered the T-28 to be a cool aircraft. His preference for the Trojan served him well. He graduated from his T-28 course as number one, which automatically qualified him to fly Navy jets. And when Larry's number one grades continued through the subsequent T-2 Buckeye and A-4 Skyhawk phases of training, he was placed to get his first choice, the F-14 Tomcat.

Lt Coy got his wings in January 1984 and shortly afterwards went to VF-101, the east coast F-14 Fleet Replacement Squadron.

However, the final phase of his A-4 course threw up quite a surprise for the budding aviator. On what should have been his final catapult launch, the crew failed to hook Larry's TA-4J Skyhawk up correctly. The left bridle was not totally on the hook. When the catapult was fired, the bridle came off the left hook but stayed on the right causing the aircraft to immediately move to the right.

The bridle, positioned behind the 7ft nose strut and travelling at 155mph, snapped off the left hook and whipped off the nose strut. The aircraft wheelied upward, slammed back on the deck and the nose broke off. By this point the air boss in the carrier's tower was yelling, "brakes, brakes, brakes."

Without the nose strut, the aircraft was in a nose down attitude skidding down the catapult track with Larry standing on its brakes. As the aircraft's nose went over the edge of the deck and off the ship's bow Larry pulled the handle, the canopy released, the air boss was yelling "eject, eject," and the jet fell to the ocean surface. By all accounts, nobody on the flight deck saw Larry's seat because the aircraft was at 90° nose down attitude when Larry banged out and his seat never got above deck level.

Larry was somersaulted away from the aircraft and hit the water hard landing on his head and shoulder. In shock,

underwater with his mask and helmet still on his head, Larry's saving grace was his FLU-8 saltwater-activated life vest. As designed, after 15 or so seconds the vest inflated bringing him to the surface. Working through the emergency procedures, Larry shed his parachute and seat only to see the carrier steaming toward him. He had immediate dark thoughts of how it might motor straight over him or draw him under and swears the ship's bow passed so closely that he could have kicked it. As it turned out he was drawn under and broke surface near the stern on the opposite (starboard) side of the ship. Fortunately, Larry was rescued by a Navy frogman after just eight minutes and got picked up by the carrier's plane guard helicopter. Larry being Larry had something else on his mind. Back on the flight deck, the landing signal officers (LSO) ran up to tell the young aviator they had not seen his chute and thought he'd gone down with the aircraft. Larry replied, "yeah well I didn't, how are my grades?" "F**k your grades." replied the LSO. "No, I was flying well, how were my grades?" "You forgot your speed brakes on the first flight," came the reply!

After receiving a medical check, Ensign Coy had to see the ship's captain. He asked Larry if he realised how lucky he was. "I know exactly how lucky I am sir," replied Coy. The captain told Larry that henceforth he would be known as Skip. "I never skipped sir," replied Larry. "OK," said the captain, "henceforth you're known as Splash." Larry's christening took place at 7:58am on December 16, 1983.

Remarkably, Splash showed true determination to carrier qualify. Just 48 hours after his accident, the junior aviator fired off the catapult, completed multiple traps, got his grades and direction from the captain that, "he was safe to go to the beach, welcome to Naval aviation."

Supersonic Terror

As a survivor of an extreme flight deck mishap in the Skyhawk, though not complacent, Splash didn't believe he would ever experience anything quite as terrifying again. He was wrong, the day arrived on a flight from Naval Air Station Oceana, Virginia during an instructor tour with VF-101.

Splash had agreed to fly in the back seat with a new student pilot on his first F-14 flight.

Having flown an easy Split S at 15,000ft, Splash suggested they fly a similar manoeuvre from 20,000ft. The student levelled up at 22,000ft, rolled the aircraft upside down and started pulling down. Normally, the pilot pulled 1G for every 100 knots of airspeed. Splash noted the airspeed at 250 knots, but only pulling 1.5G. He instructed the student to pull 2.5 G and to get the nose around. The pilot accelerated to 300 knots. Once again Splash instructed the student to pull more G, but the student accelerated to 400 knots. "Pull four Gs on this jet right now!" yelled Splash.

“We’re not going to make it, we’re too f**king fast, pull, pull, pull.”

US National Archive/US Air Force/A1C Greg Davis

According to Splash the aircraft was supersonic at 90° straight down and the student was not putting any G on the aircraft.

Accelerating like a madman, the aircraft soon showed 650 knots airspeed. Splash screamed to the pilot to put 6.5G on the jet as the altimeter was counting down 11, 10, 9, 8. “We’re not going to make it, we’re too f**king fast, pull, pull, pull,” yelled Splash. Suddenly the pilot went to 9G (the F-14 was not cleared to 9G) forcing Splash to do an anti-G strain manoeuvre to keep blood in his head. Finally, the student pilot scooped out at 2,800ft and the nose started to come up. The aircraft reached 5,000ft in no time. Despite commanding the pilot to level off, the pilot did not respond, and the aircraft’s nose continued upward passing 60° then 70°. Splash figured the pilot was G-locked and had passed out.

Asked if he were awake, the pilot was instructed to move the stick to the left so that Splash could see spoilers lift out of the left wing. The spoilers appeared and the airspeed started to drop.

“Lock your harness and put your hands on the top of the canopy because we’re ballistic and don’t have control over anything or I’m going to punch us out,” yelled Splash.

The pilot’s hands went up on the canopy while the aircraft was flopping through the air. At 200 knots, Splash instructed the pilot to put his hands back on the stick and roll to the left, continuing to talk him through the recovery and the flight back to base.

Splash reckons this incident was his most terrifying experience in an F-14: “I was more afraid in the back seat because of the thought that the last thing I would see in life, was a back-seat altimeter. That’s not how any pilot wants to die,” he said.

Desert Storm Epic

During Operation Desert Storm, Splash flew 68 missions with Fighter Squadron 14 (VF-14) ‘Top Hatters’ as part of Carrier Air Wing 3 on the USS *John F Kennedy* (CV 67). But his journey to the ‘Kennedy’ and Desert Storm started at the 1990 Cleveland air show in Ohio, over the Labour Day weekend. Splash was that season’s F-14 demo pilot. During that weekend, Splash received orders to deploy and joined the Kennedy in the Red Sea.

Each mission during Desert Storm was about seven and a half hours long. The Kennedy was underway in the Red Sea so the transit into Iraq required flying across Saudi Arabia with aerial refuelling support.

On the second night of the war, Splash led a strike package tasked with suppressing enemy air defences around Al Asad Air Base. Specifically, to suppress Iraqi surface-to-air missiles from shooting at RAF Tornado GR1s tasked to bomb the air base.

In total the mission plan involved 88 aircraft many of which were tasked to strike H3 air base. Only some of that total were assigned to the package that included Splash; eight F-14s escorting AGM-88 HARM-equipped A-7E Corsairs and EA-6B Prowler electronic attack aircraft. Things did not go well. Weather across Saudi Arabia was so bad that pilots were ripping fuelling probes off their jets when attempting to air refuel. To compound matters, visibility was so bad the receiver aircraft were forced to rendezvous using radar only. Out of 88 aircraft, less than ten got the required fuel.

With so many dropouts and diverted aircraft, only one A-7E and Splash in his F-14 were able to push on with the mission to provide some protection to the RAF Tornado GR1s. Their decision to press on was made despite the presence of seven enemy CAP stations between them and Al Asad. Splash and his RIO – call sign Weasel - argued about their ability to continue, but Splash was determined and outlined his plan to Weasel, “work the radar, we’ll lock the Iraqi jets up at 120 miles and kill them at 100 miles.” Splash figured that once the first Phoenix missile hit a target, the Iraqi pilots would turn for home. Inbound to Al Asad, Splash flew in parade position (at a 30° bearing) off the accompanying A-7E flown by a pilot call sign Dano.

When the first enemy CAP station was locked up at 100 miles all of the Iraqi jets turned for Syria. The lock up and turn away scenario repeated with each and every CAP station, Splash believes the combined threat posed by the AWG-9 radar and Phoenix missile represented almost certain shoot down for the Iraqi pilots.

At 60 miles from the target area, Splash and Dano cleared the weather, flew in a combat formation, and confirmed to each other the need to stick to the plan. Dano would launch HARM missiles at 48, 36 and 24 miles range from Al Asad with Splash ten miles in front.

At 48 miles, Splash could see the RAF Tornados on his radar, but there was no HARM launch until 36 miles followed by a second at 18 miles. At that point Dano had been lit up by an Iraqi surface-to-air missile site. Splash then entered the missile engagement zone and turned left as Dano launched another HARM over the F-14.

Meanwhile, the RAF Tornados struck Al Asad, but Splash had no time to take in the sight because four missiles were heading his way, three on his left-hand side and one on the right. Weasel screamed to turn left to avoid more missiles coming on the right, but their aircraft had already bled off some airspeed after the previous missile break and Splash had to push the nose down to get more airspeed. The boosters of the second salvo of missiles burned out and became steady bright dots. Splash then heard explosions. The aircraft started to lurch out of control and entered a flat spin. Splash immediately went through the emergency boldface procedures that required exact execution and had to be committed to memory. The aircraft's nose oscillated from 10° nose up to 10° nose down with airspeed fluctuating between 40 and 60 knots. The aircraft had no forward velocity and was plummeting to earth like a pancake. Splash kept anti-spin control inputs in throughout the aircraft's descent from 30,000ft until the nose finally tucked at 7,000ft. He said: "Air gets denser or thicker at lower altitudes and the jet most likely was able to get a better bite of air at that point."

If the aircraft was out of control below 10,000ft, procedure deemed that the RIO should command eject, because a Tomcat could not recover from a spin. However, during Desert Storm, Splash made agreements with all of the back seaters he flew with, that he would not eject from the aircraft behind enemy lines, but ride into the dirt.

Splash got the aircraft back up to 400 knots airspeed and out of the target area. But there was more trouble ahead when Splash got a vector from an AWACS. Weasel got a lock on to a target flying at 35,000ft and Mach 1.5. The fast mover had already locked up the F-14 and was not squawking which implied that it was an enemy aircraft. Splash jinked his aircraft to the left and the fast mover also corrected his track in order to intercept the Tomcat. However, only one of the required two radar controllers had declared the aircraft as a bandit and consequently Splash was unable to shoot. Another controller called, “scram, scram, scram,” meaning a missile engagement was imminent.

Weasel wanted to break the lock, but Splash said no and pulled the Tomcat’s nose back ready to beam the target and immediately dive down low after a Phoenix shot.

The Iraqi aircraft went screaming by the Tomcat allowing Splash to bug out to the south and back to the ship. More CAP stations were in place, but each time Weasel locked up the first targets they turned away.

When Splash crossed back over the pipeline road, he had less than 1,000lb of fuel remaining so a perfect radar rendezvous with any of the four waiting tankers was critical. Finally, with 10 knots of closure, Splash spotted the left wingtip light of the awaiting KC-135. Desperate to upload fuel, Splash edged his Tomcat into the air refuelling basket. The boomer asked, “what quantity of fuel was required?” “20,000lb,” replied Splash, “and start pumping because the engine is likely to flame out at any moment.”

Driving rain back at the ship meant that if they hadn’t been able to refuel, Splash only had enough gas for one attempt to land.

Back on the *Kennedy*, Splash got out of his cockpit and laid on the deck, thankful for being back on board. Weasel on the other hand was still in his seat. Concerned about his RIO, Splash climbed up and asked if he was alright. “Splash,” he replied, “I can’t do this anymore." Splash assured him that he had been scared too and encouraged his crewmate to go change and meet him in the vault with the intel guys where they learned the outcomes from their mission. It was not good news. The TARPS F-14 had been shot down and while the pilot evaded capture and was rescued the following day, the RIO was caught and brutally treated by the Iraqis during his incarceration

Splash did a lot of reflecting that night. He decided war was awful. But he survived a further 66 missions.

18 Hours in the Saddle

Staying with Operation Desert Storm, Splash conducted another epic mission which involved multiple CAPs and he ended up strapped into his seat for well over 18 hours.

Splash had flown one eight-hour mission to Iraq, had recovered to the Kennedy and was on his parking spot when VF-14’s operations officer (OpsO) came up to the cockpit and

An F-14A Tomcat assigned to Fighter Squadron14 (VF-14) ‘Top Hatters’ launches off the flight deck of USS *Theodore Roosevelt* (CVN 71) in the Persian Gulf in support of Operation Southern Watch. US National Archive/US Navy/PH2 Regina Wiss

An F-14A Tomcat receives fuel from an Air Force tanker aircraft while on a combat air patrol. US National Archive/ US Navy/PH3 Chester Falkenhainer

told him not to get out of the aircraft. Splash asked him what he was being tasked to do. “Another Bong CAP. Just get your gas and go,” came the reply. Splash asked him if he could get some food and water to which he was told no. Splash told the officer to get off his jet in disgust. Thankfully, the RIO assigned to Splash for the next mission gave him water and cookies. The two officers launched and flew the Bong CAP mission and recovered to the ship, the second time that day for Splash. Understandably Splash felt sore when he got out of the jet after his second mission. As he walked into maintenance control to sign his jet back in, the OpsO asked him to remain is his gear. “Okay, what have you got?” asked Splash. “You’re going to the Gulf of Aqaba for six hours,” replied the OpsO. “I’m not going there because we have pilots that have not flown in a couple of days,” said Splash. “What if I order you?” said the OpsO. “I’d say, f**k you, I’m going to bed,” said Splash. “I order you to go to Gulf of Aqaba,” said the OpsO. “F**k you, I’m going to bed,” said Splash.

The following day, Splash went to the squadron ready room where Cdr Doug 'Dongles' Law, the commanding officer asked him if he had refused to go on the mission the previous day. “Skipper, I had been strapped into my seat for over 18 hours, and FUR (an acronym for F**cked Up RIO) wanted me to get back in a jet and go to the Gulf of Aqaba for six hours. He had guys that had not flown in a couple of days, replied Splash. Dongles asked the question, “what do you mean you were strapped into your seat for 18 hours?” When I returned from a Bong CAP, FUR brought me a new RIO, didn’t bring me any food and water and I launched on another mission,” said Splash. “What?” said Dongles, “FUR, did you get Splash to do two Bong CAPs and not let him get out of the jet?” “Yes,” came the reply. “You’re fired,” said Dongles.

The term Bong CAP was adopted in honour of United States Army Air Force P-38 Lightning pilot, Major Richard Ira Bong, America's number one Ace of all time, who shot down 40 Japanese aircraft during World War Two and a Medal of Honor recipient.

Reflections

Splash cherished his F-14 career. He clocked up just shy of 4,000 hours flight time and did everything in the Tomcat that a pilot could possibly do. Not many pilots achieved that. Despite all of the operational experience, he maintains the most rewarding role in his career was when he was able to mentor a student pilot who was struggling with the syllabus and improve the pilot’s airmanship and performance flying the F-14. Splash always told his instructor pilots to not act like evaluators but as instructors to make their students better. That was their job.

One example of how Splash enjoyed flying the Tomcat involved differential stab spoiler rolls. He loved flying upside down and had the perfect jet to do so; the F-14. Its base airframe limit for negative G was -2.4.

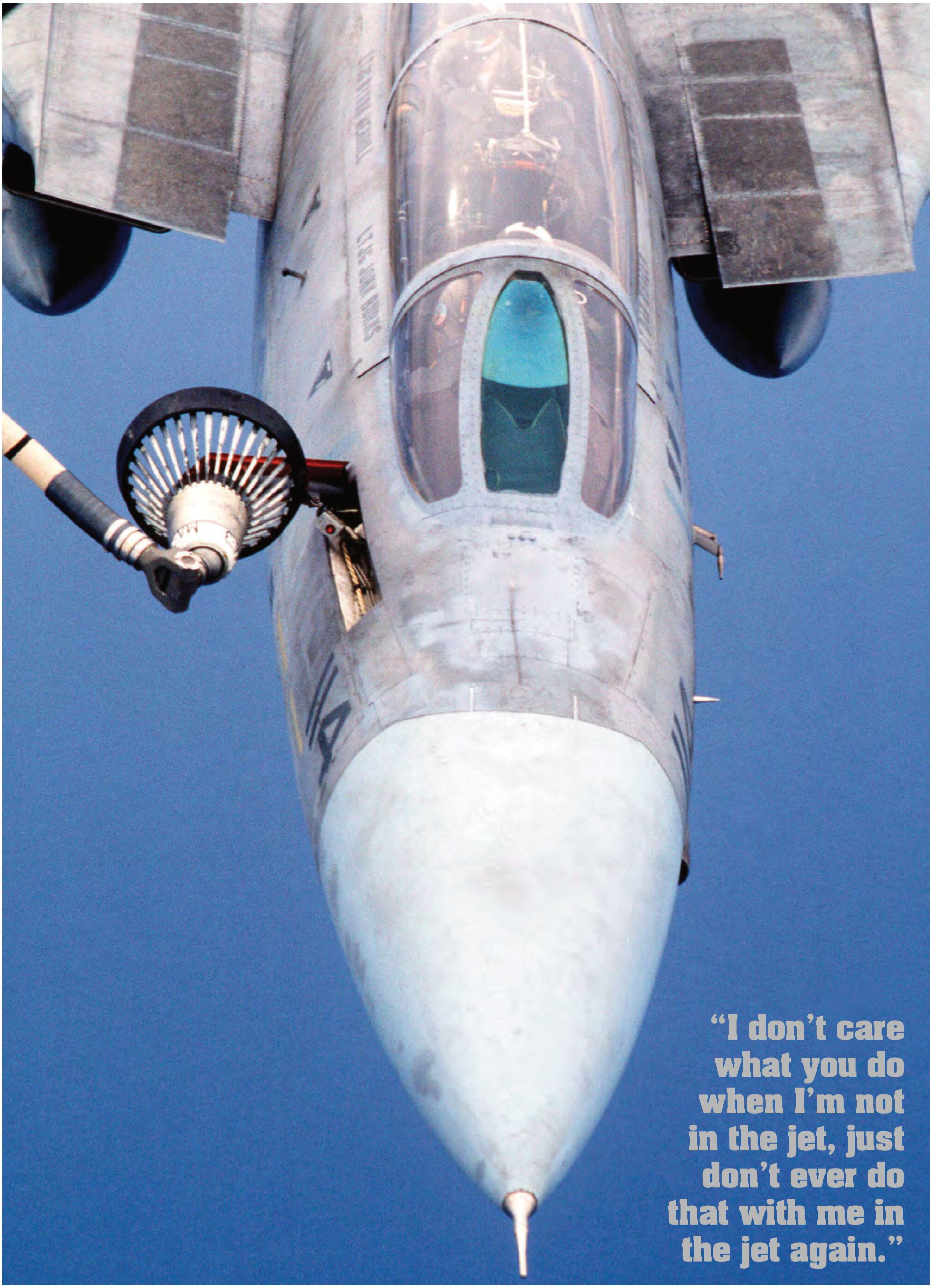
To fly differential stab spoiler rolls, Splash rolled his aircraft upside down and pushed forward on the stick so that the wings bent like a duck’s wing and held it there for about 18 seconds. After 20 seconds the engines were starved of oil. Splash then put G back on the jet.

When serving as an instructor pilot on VF-101, during a post maintenance check flight flown with the squadron skipper, Splash asked his boss if he wanted to fly upside down? “Yes, I heard this about you. Wait a minute while I strap in,” replied the skipper. “OK,” said the skipper. Splash yanked the aircraft over into inverted flight. Boom, the aircraft immediately went to minus 2G. After 18 seconds, Splash slapped the jet back over to level flight.

“Why do you do that,” asked the skipper? “Do what,” replied Splash? “Do that,” growled the skipper. “Because I can,” said Splash. “Don’t ever do that with me in the jet again,” yelled the skipper. “I don’t care what you do when I’m not in the jet, just don’t ever do that with me in the jet again,” he yelled.

Flying at negative G, causes the pilot or RIO to come out of their seat. If they are not strapped in tight, they can’t talk on the radio or intercom. In the backseat, the RIO talks on the radio using foot pedals; a button on the left side operates the radios, the intercom control is on the right pedal. Flying inverted with Splash, his skipper could not reach the pedals while he was pegged up against the top of the canopy!

An F-14A Tomcat clears the deck of the USS *John F Kennedy* (CV 67) during Exercise Display Determination 86. US National Archive/ US Navy/PH2 Don Koralewski



“I don’t care what you do when I’m not in the jet, just don’t ever do that with me in the jet again.”

A Disciple

Throughout the 1980s, US Naval Reserve operated four F-14 Tomcat squadrons. Two were based at Miramar.

Fighter Squadron 301 (VF-301) 'Devil's Disciples' was one of two US Naval Reserve fighter squadrons based at Naval Air Station Miramar, California. The unit started its hardware transition from the F-4S to the F-14A Tomcat in October 1984 a process completed in the spring of 1985.VF-301 made its first F-14 deployment, involving the entire squadron, to Naval Air Station Fallon, Nevada on August 4, 1985 for an air wing training detachment.

The Disciples flew the F-14A until the unit was disestablished on September 11, 1994, the date that its sister squadron, VF-302 'Stallions' also passed into history.

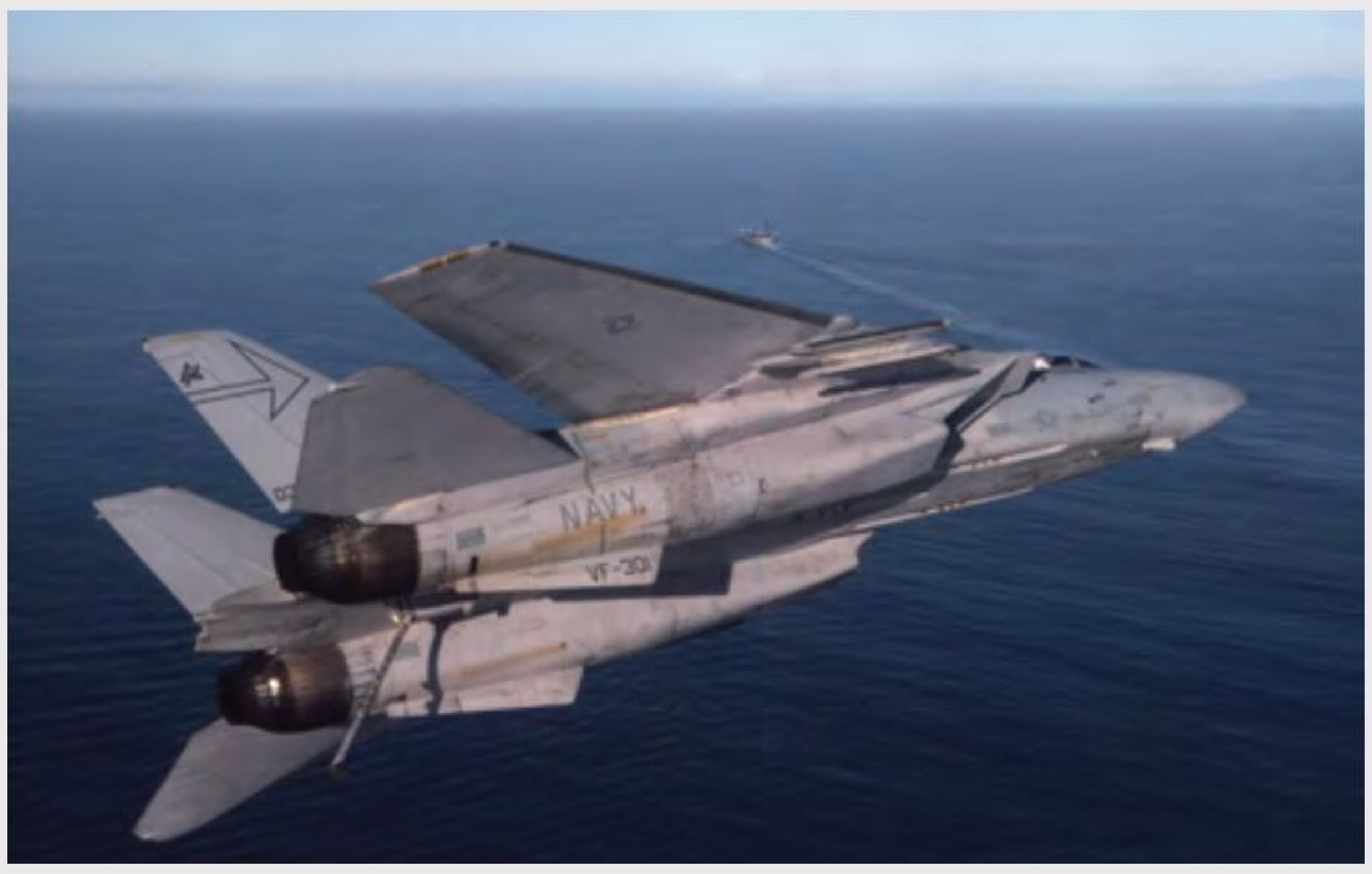
Getting Tomcats for the Reserves

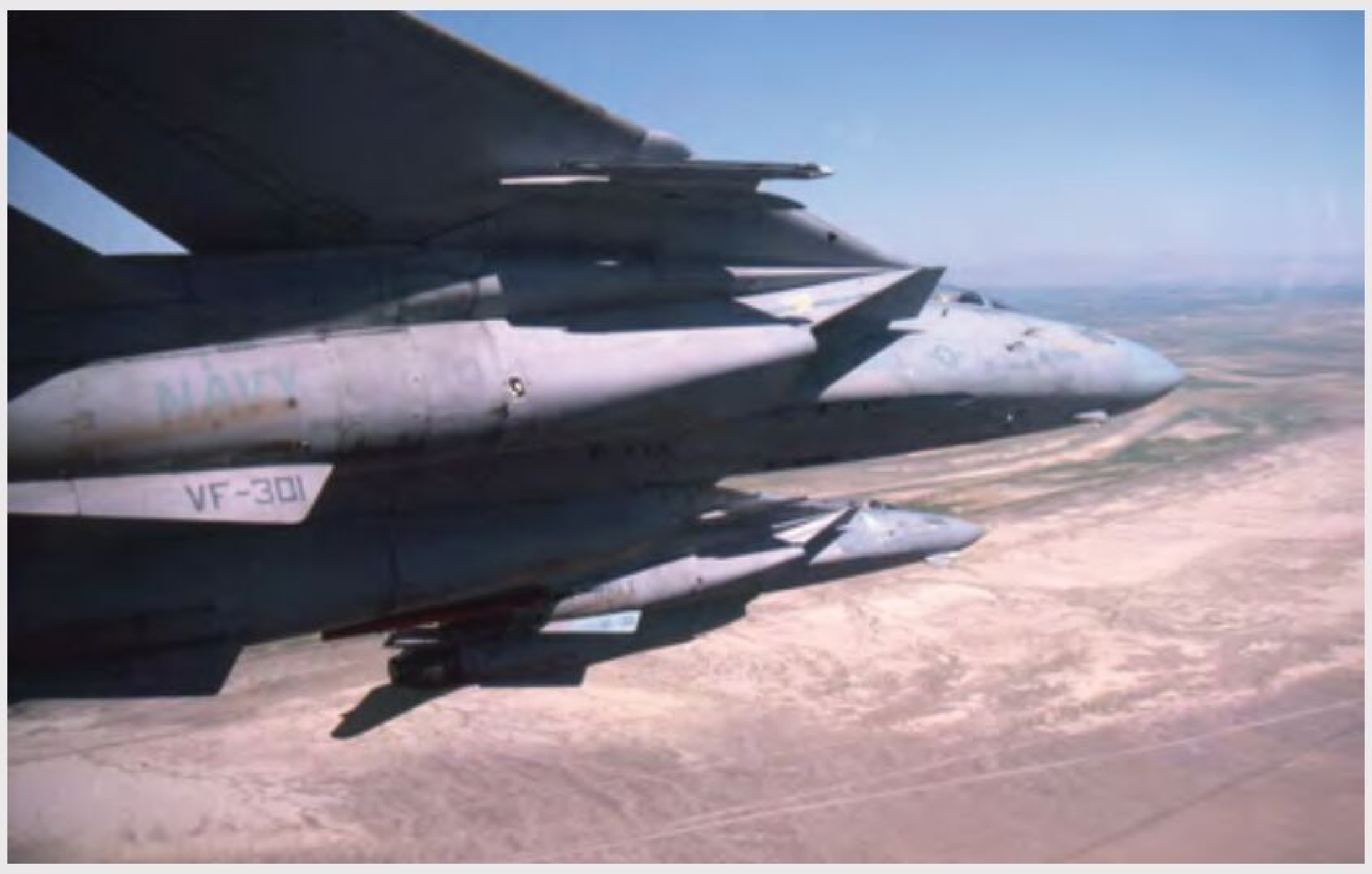
Back in 1983, the then Secretary of the Navy, John Lehman, himself a Reserve naval flight officer flying A-6E Intruders at Naval Air Station Oceana, Virginia, initiated a programme to place the Reserves on a similar footing to the active-duty Navy. In time of war, flying F-4S Phantoms was of limited use, particularly as most carriers were no longer equipped to operate the F-4. The Tomcat was deployable and much more capable.

At that time, about half of the Reserves serving with VF-301 and VF-302 already had active-duty F-14 time, so their experience was of great assistance to the squadrons. Transition to the Tomcat was set for a good start.

To prepare for its transition, VF-301 aircrews were divided into two groups to attend a two-week training programme with VF-124, the resident F-14 Fleet Replacement Squadron at Miramar. Half attended in early August, the other half in early September 1984§. Training was straightforward, the crews learned cockpit procedures, how to run on board checks such as alignment of the inertial navigation system

An F-14A assigned to VF-301 with its wings swept back to 68° descends for a run in and break at Miramar in August 1985. Lt Cdr Jan Jacobs





«« F-14A BuNo 158999/ND103 of VF-301 in low holding, lines up for the break over USS *Ranger* (CV 61) while operating in the Southern California operating area near San Diego on January 25, 1986. Lt Cdr Jan Jacobs

« A section of VF-301 F-14A Tomcats on the run-in to break at Naval Air Station Fallon, Nevada. Lt Cdr Jan Jacobs

by the RIO. Pilots learned start procedures, including mastering the F-14's complicated wing sweep system, basic handling and flying. After the two-week course, crews flew with instructors in VF-124 aircraft before returning to VF-301 with their F-14 NATOPS qualification.

A Different Kind of Drill

Continuation training over the next year involved learning about the F-14's weapon systems and the different tactics employed in the Tomcat compared to the F-4. This training was undertaken during normal weekend drills. A weekend usually consisted of four four-hour drill periods. Reserves had to work 48 regular drill periods per year. Flight crews were given an additional 72 four-hour drills per year to retain currency, and meet an annual 100-hours flight time requirement.

Discussing the Reserve drill system, Lt Cdr Jan Jacobs, a former VF-301 F-14 radar intercept officer said he worked close to Miramar such that he could see the aircraft in the pattern from his office. Jan used to leave his office early in the morning, drive to Miramar and go to VF-301 in civilian clothes, change into his flight suit, brief, fly a mission, and debrief all within a single four-hour drill. By lunch time he was sitting back at his desk, and then worked late to make up for the time. On other occasions, Jan started work early, would leave his office mid-afternoon, go to the base and VF-301 in time to fly an afternoon air combat manoeuvring mission. But rather than calling that a day, Jan and his pilot colleagues would recover to Miramar, remain in the cockpit during refuelling and go back out for a radar intercept mission. Two drills complete, and typical of VF-301's flight schedule.

A flight of VF-301 Tomcats fly low over marshes to the south of Naval Air Station Fallon, Nevada awaiting their turn to run-in and break for landing.
Lt Cdr Jan Jacobs

Additionally, the entire squadron undertook an annual two-week training period, usually completed at Fallon or on a carrier.

Impressions of the Tomcat

Jan recalls that an F-14 crew spent much of their time trying to figure out which information was required from the various displays, and how to decipher it. Everything in the Phantom cockpit was shown on analogue dials and displays. The Tomcat on the other hand had a mixture of analogue and digital displays showing different flight and battlespace information depending on the mode of operation. An F-14 RIO had to figure out what mode the radar and weapon system was in and where the required information was located. The RIO also had to know how to manipulate the controls to gain the required information.

A VF-301 F-14A joins on the tail of the lead aircraft during a mission from Miramar on February 23, 1986.
Lt Cdr Jan Jacobs

One of two F-14As making instrument approaches to Miramar in November 1985.
Lt Cdr Jan Jacobs

That said, Jan found transition from the F-4 to the Tomcat to be straightforward describing the F-14 as a hybrid of analogue and digital technology. Switching radar modes involved a nose-mounted tape machine being able to read the tape which took three to four seconds. The system did not always work on the first attempt and required the RIO to recycle the change. On some occasions it might take three attempts before the system worked.

According to Jan, the RIO had to know how to work around such issues so the system would do what was required.

Consider the F-4 Phantom which had two radar modes; search and track. In search mode, the RIO would see a blip, use the hand controller to place a cursor over the blip to lock the radar onto the target. The radar gave the target's range, angle and speed, but the RIO couldn't see anything except that one target.

Using the F-14 radar, the RIO could use the track while scan mode which allowed him to follow a number of targets. Additionally, the AWG-9 system displayed the target's altitude, speed and other information so the RIO's situational awareness was several orders of magnitude above that of the F-4.

Armed with AIM-7 Sparrow and AIM-9 Sidewinder missiles, the F-4 Phantom was lightly armed compared to a Tomcat which had a 20mm cannon and AIM-54 Phoenix missiles in addition to Sparrow and Sidewinders, a quantum leap of firepower for the Navy.

VF-301 was assigned to Carrier Air Wing Reserve 30 based at Miramar, having moved south from Naval Air Station Alameda near Oakland, California in July 1985. The wing made several deployments to Fallon for Alpha strikes. Jan reckons VF-301 escorted the strike packages out to the range providing fighter cover, often including aerial refuelling with A-7 Corsair IIs with buddy stores or KA-6D Intruder tankers. Other missions included air-to-ground strafing on the Fallon range and air combat manoeuvring.

During intercept missions, usually against a BQM-34 Firebee or BQM-74 Chukar drone, the RIO was responsible for getting the aircraft in the required position to suit the weapon. A RIO's main roles were to acquire the target and get a positive radar lock on, and to conduct lookout duty for traffic avoidance.

Discussing the RIO's role, Jan said that in an F-4 everything was done by the pilot in the front seat, while in the F-14 the pilot selected the missile, but the RIO could launch radar-guided missiles, either a Sparrow or Phoenix, whichever was selected by the pilot.

Reflecting on his time with VF-301, Jan said he enjoyed flying the Tomcat and described the F-14 as a magic weapon system for the time.

⮝ VF-301's CAG-bird seen in March 1986. Lt Cdr Jan Jacobs

⮟ An F-14A conducts refuels with a KA-3B Skywarrior assigned to Tactical Aerial Refuelling Squadron 308 (VAK-308) 'Griffins' during Carrier Air Wing Reserve-30's active-duty training in 1987. Lt Cdr Jan Jacobs

Lessons from a Legend

Some Navy aircrew are fortunate to be in the right place at the right time. **RIO Major Murray** found himself flying with a Navy legend.

If a nugget RIO had a choice in how to start their F-14 flying career, Major Murray would have probably chosen a first flight just the way his turned out.

His mentor was a Vietnam veteran and former F-8 Crusader pilot, Commander Joe Satrapa, known as Hoser, and a legend in the Navy fighter community. So much so, the Navy established a special programme so that he could continue training pilots in air-to-air gunnery, his specialty.

On the day of Major's first Tomcat flight, the sea temperature was cold necessitating the need for dry suits and as Major was wrestling into his for the first time, Hoser walked in to the room, changed into a turtleneck garment and flight suit, and pulled its cuffs out of his suit to give the appearance of wearing a dry suit.

Major said it was his first introduction to 'fleet rules'.

At the aircraft Hoser leaned in the back cockpit and pointed to a circuit breaker on the left side. He said: "See that circuit breaker, when I tell you, pull it."

When pulled, the circuit breaker in question removed the safety interlock so that the inboard most flaps could be lowered while airborne. Usually these flaps would only be lowered in the landing configuration. This was an override so that if the wings were programmed back, the flaps could not be driven into the side of the aircraft, so they were locked up.

Hey Joe Parsons

After working through the syllabus events for the mission, Hoser had fuel left over and spare time. Positioned in the operating area off the coast of Virginia, Hoser dialled in a frequency used by the aggressor squadron at Oceana and made a call: "Omars are you ready to play?" An A-4 pilot responded: "I'm in an A-4 completing a post maintenance check flight and will be done in 15 minutes with half a tank of gas."

Hoser confirmed rendezvous details.

Major recalled being on his first familiarisation flight and preparing to go into a dogfight with little comprehension of how much fun it was going to be. Major reminisced: "We met up for a quick air-to-air brief, headed north at 18,000ft and entered the fight.

Hoser called: "Hey conehead, what are you looking at?"

Conehead is a slang term for a student

"The other plane," replied Murray.

"No, you idiot no, look at his control surfaces," hollowed Hoser.

Instead of looking at the other plane, Hoser wanted Major to look at the A-4's flight control surfaces.

Explaining, Hoser called out: "The control surfaces move before the plane does. Don't look at the plane, look at the control surfaces, either the stabilizers on an F-14 or in this case on an A-4 look at the ailerons and elevators. That's how you know where he's going to go, which surfaces move first."

Major said it was a tip that he used for the rest of his career.

Hoser then called out: "Remember that circuit breaker, pull it now."

Remembering the engagement, Major said: "Our aircraft started climbing above and behind the A-4 which sped out in front of us because the Tomcat now had the ability to fly a lot slower with a lot more lift because it was in a landing configuration rather than a fighting one." Hoser pursued the A-4 and shot it down, then made a call to Major to put the circuit breaker back in.

Laughing, Hoser called the A-4 pilot who was a friend: "F-14A+ baby."

An A-4 could usually neutralise an F-14A, and with a really good pilot could often win the fight. However, with the extra thrust afforded by the F110 engines in an F-14A+ and the effect of putting the big flaps down, it meant a good pilot could get the guns on an A-4.

Major said that his first flight was full of personality and full of nothing that was in the syllabus!

Aerial Gunnery

When Major flew air-to-air gun scenarios, everything was close in and visual.

On one mission involving four Tomcats, Hoser flew with Major and the other three aircraft were flown by student pilots with instructor RIOs in the back seats. An aggressor A-4 towed the target banner.

All four Tomcats flew a gun pattern; approach the banner, shoot at the banner, pass over the banner, and move to the side; it's an extremely dynamic situation putting on and pulling off G using live rounds.

The event was not going well. Timing was out such that pilots rolled in on the target at the same time. Major knew Hoser was not happy with the other pilots.

Hoser walked into the debrief and said: "I thought it was going to be rough, but little did I know. We started off with a goat rope. Pretty soon it turned into a circle jerk, and before I knew it I had a full-on cluster f**k on my hands."

Swordsmen section, VF-32 Tomcats each loaded with live missiles. Hey Joe Parsons

Using different coloured rounds helped identify what score each pilot achieved. Of the class of four, one student had three hits, another had five, and the third got 11. Hoser had 72 hits. He was a master of air-to-air gunnery.

The banner was hard to hit. A pilot had to control speed and work a firing solution. A pilot needed to be in the right position at the required time.

USS *John F Kennedy*

After his course, Major received orders to meet a squadron already at sea, VF-32 'Swordsmen' on the USS *John F Kennedy* (CV 67) mid-deployment in the Mediterranean. Seventy-two hours after his course was complete at Oceana, Major was embarked and on VF-32's flight schedule. It was October 1988.

On the first morning, underway off the coast of Italy, the Carrier Air Wing 3 was conducting a strike in a NATO exercise. Major's pilot was Dave Smith known as Smitty, a very good junior officer on his second deployment and known as one of the "smoothest sticks" in the air wing.

Out on the flight deck, Major was at his jet when Smitty ran over and shouted: "Get in, we got to go."

Major had discovered that a communication switch on the left foot pedal used to speak to the pilot was out of track, but Smitty cussed at Major to get in the plane. Major was trying to yell over the jet noise to let his pilot know about the problem.

As Smitty was taxiing to the catapult, Major felt so behind in the pre-launch processes that he was not even in the jet. Right off the front end, Smitty and Major received the call, 'Gypsy 205 dial strike now'. Dialling in, Major heard the vector to an inbound Italian Tornado hell bent on attacking the ship at low-level. Major had to tweak his radar to find the bandit and then bring the Tomcat to the merge. Smitty and Major hit the required numbers to show the Tornado was engaged before it got to a weapons release point. Running in toward the carrier, the Tornado pilot dropped lower and lower. Smitty stayed right beside the Italian jet and yelled out, "this pilot is p**sing me off, read out the RADALT to me."

RADALT is an abbreviation for radar altimeter, a ground warning altimeter that gives an accurate altitude.

Major read his RADALT. It showed 100 feet.

Finally, Smitty engaged the burners, the wings came back, and the Tomcat flew under the Tornado. In doing so, Smitty relieved his frustration over the pilot flying so low.

Major read the radar altimeter down to negative and yelled at Smitty who laughed and replied: "Are you wet yet?"

Smitty then flew over the top of the Tornado on the other side.

When Major got out of the aircraft, he reckons he was emotionally and physically wrung out, but had experienced one of the most satisfying days of his life.

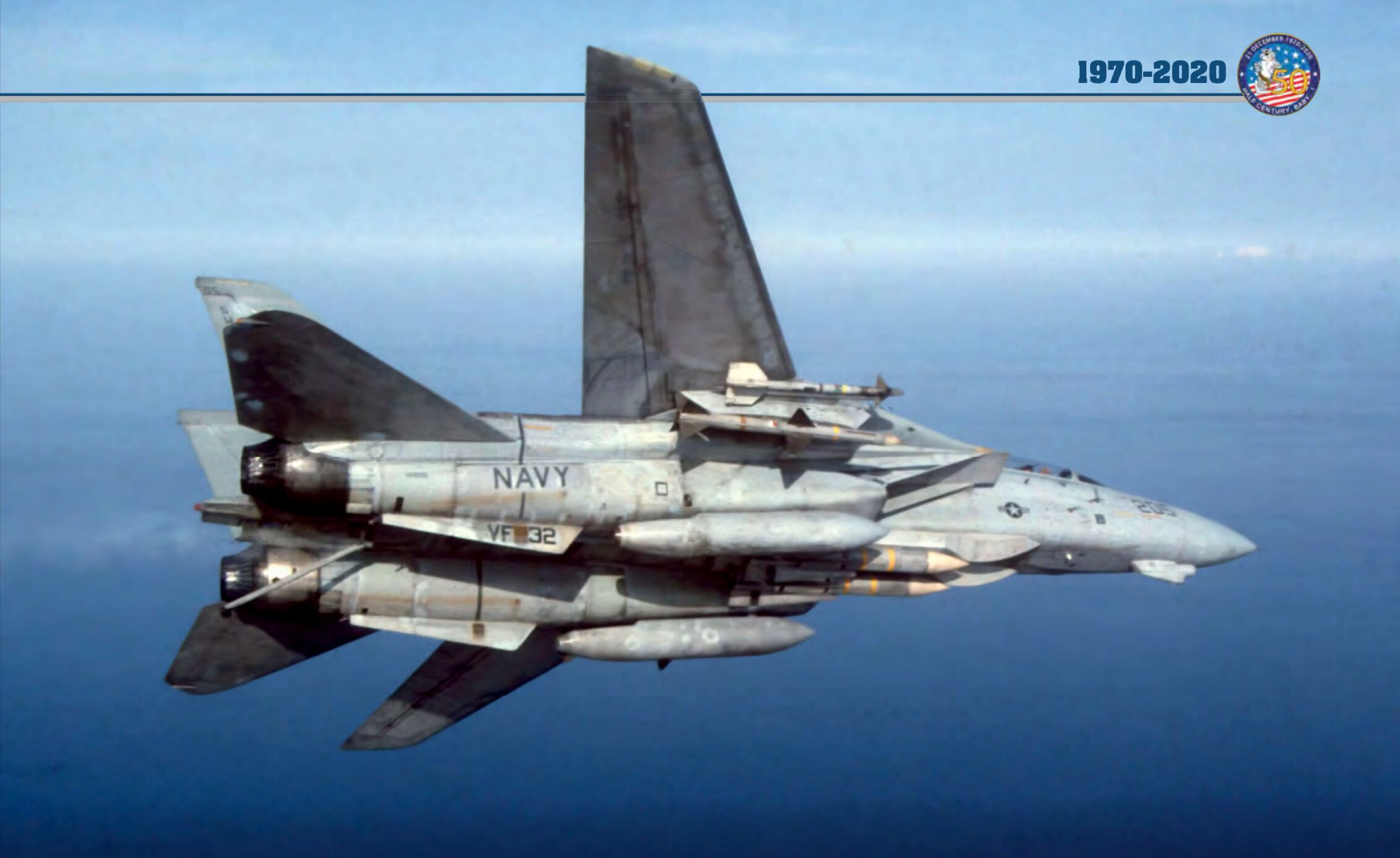
After a night flight flown with another junior pilot in the squadron, when Major returned to the squadron state room, a senior RIO noticed he was quiet and asked, "what's wrong rookie?"

"Not much," replied Major.

Another RIO turned, laughed and said: "He flew with H***e!. Hey rookie, don't you know? Half the pilots in the Navy are below average, and you just got one. Not everyone flies like Smitty."

That was one of the biggest lessons Major learned. As a RIO he didn't just operate the radar, he was a co-pilot in every sense, a co-pilot without a stick and control.

Knowing every single thing about the flight better than the pilot was key to helping a below average pilot get back and for post-flight discussions. Major decided he had to know everything about each flight to provide help when required.



Gypsy 205, loaded with six live missiles: two AIM-7 Sparrows, two AIM-9L Sidewinders and two AIM-54 Phoenix. Lethal punch.
Hey Joe Parsons

> “He flew with a rookie pilot. Half the pilots are below average, and you just got one.”

New ROE

In the aftermath of the bombing of Pan Am Flight 103 over Lockerbie, Scotland on December 21, 1988, the Navy’s rules of engagement were changed. Transiting to the Eastern Mediterranean near Libya, on January 3, 1989 air wing aircrews received a briefing about the new rules of engagement. The briefing instructed aircrews on what constituted hostile intent. Specifically, a bogey flying a nose-on profile to Navy aircraft that had tried to turn away several times. If the bogey continued with a nose-on profile it was considered hostile intent. At that point, a Navy jet was allowed to shoot, and no longer had to wait for a bogey to fire first.

On January 4, 1989, Smitty and Major flew the first launch of the day and set-up a CAP for a couple of hours and returned to the *Kennedy.*

There was lots of activity on the flight deck. Smitty and Major received hand signals instructing them to refuel and relaunch,

But when they launched, they didn’t know exactly what was going on. For this mission, their wingman was a VF-14 jet. The two jets established a CAP station, flew around for a time until a call came from control directing them to investigate a contact: a Libyan transport plane flying northeast from Libya.

Control asked Smitty and Major if the aircraft was notable. It was a typical transport plane similar to a C-130. After shadowing the aircraft for 45 minutes, the Tomcats were directed to disengage.

Back on the ship, Major was in VF-32’s ready room when the squadron duty officer Scott Grundmeier answered the phone and said “VF-32 MiG killers!”.

Major responded: “That’s not funny Grundy, what are you talking about?”

“We shot down two MiG’s today,” came the reply.

In the time Smitty and Major had left their CAP station and switched to the ship’s administration frequency, two Libyan MiG-23 Floggers got shot down by two other VF-32 F-14A Tomcats. The new rules of engagement had had an immediate effect.

The jets and aircrew were; BuNo 159610 call sign ‘Gypsy 207’ crewed by Cdr Joe Connelly (VF-32 CO and pilot) and Cdr Leo Enwright (CAG-11 OpsO and RIO), and BuNo 159437 call sign ‘Gypsy 202’ crewed by Lt Herman Cook (pilot) and Lt Cdr Steve Collins (RIO).

For Smitty and Major, they had flown in a tense combat situation, but didn’t know anything about the event while airborne!

This shot of Gypsy 206 with fully swept wings and air combat manoeuvring instrumentation pods is from the Fallon range in northern Nevada.
Hey Joe Parsons

Confronter

With more than 1,000 hours in F-4 Phantoms, this aviator chose to transition to the Tomcat rather than the brand-new Hornet. He has no regrets.

When Lt Jon Schreiber walked out to his assigned F-14 Tomcat on October 2, 1986, he still recalls how big and impressive the aircraft looked. Jon had previously flown Phantoms, lots of Phantoms, F-4Js, F-4Ns and F-4Ss.

Jon was no stranger to fast jet flying and had arrived at VF-124 from Naval Training Command as a flight instructor. When it was time for Jon to move on he called his detailer. A detailer is an officer working at the Department of the Navy who assigns people vacant jobs around the service. He was asked, “what coast and what aircraft? Whatever you want, you can get it.” Jon was astonished with the offer.

Jon chose the west coast and the F-14 which might seem an odd choice at a time when the all-new F/A-18 Hornet was just arriving on the block? However, Jon was used to flying with a back seater and liked having a second person on board, so the Tomcat was his choice.

Despite a flight career with 1,000 hours on Phantoms, Jon had to take the full F-14 course with Miramar-based training squadron VF-124. This allowed Jon to get the number of hours required to get certified in the aircraft and to become highly familiar with all of the systems. However, his experience of different F-4 radar systems gave him a good feel for how to run an intercept, which made the course syllabus a little easier.

Jon describes his first Tomcat flight as being a lot of fun noting the aircraft’s smooth transition to supersonic flight. He practised using the auto throttle, explored the systems to see how they worked, and flew ten landings and an instrument approach back at Miramar.

Comparing the F-4 Phantom to the F-14 Tomcat, Jon noted one distinguishable aspect: “When you did a guns’ defence in a Phantom, say in a high G turn, and you wanted to get away from the bogie, it required a hard turn, as much G as you had on the aircraft to get it out of the way of the bogie’s gun.

“When you were in a turn in an F-14 and somebody rolled in and was getting ready to gun you, you could roll out and pull up or you could roll over and pull down. Either manoeuvre gave the bogie a side view of your aircraft. The F-14 is a thin aircraft compared to the Phantom and made a smaller target in the bogie’s gun sight, hopefully not on the fuel tanks but a non-explosive spot. I had to break a habit to get that right and it took me a few flights.”

First Carrier Landing

At the end of Jon’s course with VF-124, he like all other nugget pilots had to get carrier qualified. His efforts to achieve CQ is an interesting story in itself and Jon thinks he’s probably the only pilot who disqualified himself from a ship. At the time he was finishing field carrier landing practises (FCLPs) at Miramar, his wife and children were sick, so he was having a challenging life on the home front. He successfully completed the required six daytime traps, which were to be followed by four night-time traps. But on the night of his final phase, Jon was short of sleep and tired. On one of the approaches, he realised he had no idea what he was doing but got waved off because another aircraft was in the flight deck landing area. On the go around, as Jon tried to turn downwind, he felt that he was unable to make the F-14 turn. He said: “I had vertigo so bad and felt uncomfortable with the situation and declared I was de-qualifying myself and heading back to Miramar.”

Subsequently, Jon told the Navy evaluation board how he had not felt comfortable with the situation that night and did not want to do anything unsafe on the flight deck. The board agreed with his decision. He went to the carrier again and finished all of his night time traps.

A pilot looks out at a pair of F-14A Tomcat aircraft from Fighter Squadron 2 (VF-2) over the Pacific near San Diego, California.
US National Archive/
US Navy

Two VF-2 F-14A Tomcats fly over the USS *Ranger* (CV 61). US National Archive/US Navy/Lt Cdr Baranek

Bounty Hunter

When Jon completed his course, he received orders to Fighter Squadron 2 (VF-2) 'The Bounty Hunters'. Though he had not officially left VF-124, his first flight with VF-2 was a night-time FCLP on May 26, 1987, a training requirement in preparation for deployment to the Indian Ocean on board the USS *Ranger* (CV 61) with Carrier Air Wing 2.

USS *Ranger* was on station during Operation Earnest Will involving American military protection of Kuwaiti-owned tankers from Iranian attacks in the Persian Gulf and Strait of Hormuz. In effect between July 24, 1987 and September 24, 1988; it was the largest naval convoy operation since World War Two.

VF-2 and its sister squadron VF-1 'Wolfpack' were flying combat air patrols, waiting for Iranian forces to attack ships transiting through the Strait of Hormuz three or four at a time.

Jon recalled one mission: "One of our pilots was vectored on to a target that looked like the profile of a Silkworm missile. He was cleared to kill the target if it was a Silkworm. It was not. It turned out to be a French F-8E Crusader from the aircraft carrier *Foch*. The debrief revealed the French pilot had lost electrical power, didn't have his radio or his transponder, and had gone feet dry. He had dropped down to a low altitude and was flying subsonic, factors that made his aircraft look a whole lot like a Silkworm. Fortunately, the Tomcat crew realised it was a French F-8 after turning on to their vectored target. Subsequently, some of VF-2's crews visited their French counterparts on board the *Foch* for a drink or two.

Missile Shoot

On the transit back across the Pacific, VF-1 and VF-2 undertook a missile shoot off the coast of Hawaii. Loaded with his allocated AIM-9 Sidewinder missile, Jon launched from the USS *Ranger* bound for the missile firing range. However, the range went red which meant it was closed so Jon returned to the carrier, landed, got more fuel, stayed on deck for a while eventually taking off again, only to return again and again.

Once the range was green, two Tomcats, including the one piloted by Jon, were cleared into the range. In accordance with the plan, a pilot from VF-1 launched at the drone bogie first, and Jon was to follow through with his shot.

Jon watched on as the missile came off the VF-1 jet and reckons that the missile looked like it was tracking the drone correctly. As the pilot of the VF-1 jet relinquished his lead position, Jon confirmed with the pilot that his VF-1 jet was disarmed. With confirmation received, Jon moved to the lead position in a hard left turn and launched the Sidewinder missile. Jon watched the missile come off the rail on his jet, checking to see that the missile's motor was ignited, it was. However, as Jon manoeuvred his Tomcat, he lost visual on the missile because he had to look inside his cockpit to make sure his Tomcat was operating properly. When he looked back outside for the missile, it had made a hard turn to intercept the drone to the left of the flight path of his aircraft. While Jon did not have a tally-ho on the missile during the last moments, he reckons the drone engagement was a near miss. No harm was done, VF-2's missile shoot success rate remained intact, and the squadron went on to win the Boola-Boola award for air warfare excellence.

Catapult Engine Failure

Operation Nimble Archer was a combined sea and air strike conducted within Iranian territorial waters by Navy surface ships and aircraft assigned to Carrier Air Wing 2 on October 19, 1987. The attack was retaliation for a missile attack on the oil tanker MV Sea Isle City.

On the day of the strike, Jon was tasked as a sapre aircraft in a TARPS-configured F-14 at maximum gross weight launching from a waist catapult. However, the right engine blew at the point when the aircraft's weight came off wheels at the end of the catapult shot.

Recalling the sequence of events Jon said: **"**We went through a series of maintenance checks with the engines turning. Part of the maintenance check involved cycling the inlet ramps multiple times. I had cycled the ramp switches from auto to stow several times and apparently left the right engine ramp switch in the stow position prior to taxi. When taxiing out we went through the take-off checklist again, a list that doesn't include the ramps but does include "all warning and caution lights out"...I guess I missed the ramp light. That was a maintenance action, something out of the ordinary. I had never touched the inlet ramp switches before and simply missed it when I did a quick scan of the cockpit.

"As soon as we lifted off, the right engine ramp dropped down and snuffed out the right engine [if a ramp drops down at subsonic speed, there's not enough air going into the combustor to keep the flame burning and it snuffs out]. Next thing, we're looking at the side of the boat. The back seater said, 'you got it'? "Yeah, I think so," I replied. The jet settled a little bit allowing me to fly out and try to re-start the engine. The ship made me come back around and do a simulated single engine approach with the right engine set at idle. Fortunately, I was able to make a good landing. It was a mistake and shows you that if you break your normal habit

> “As we engaged him, we get into an oblique rolling scissor to get the advantage on him.”

USS *Ranger* (CV 61) and an Iowa-class battleship underway in the North Arabian Sea, as an F-14 Tomcat turns toward the ship. US National Archive/US Navy/Lt Cdr Baranek

pattern, something bad can happen.

“Normally, when you take off, you do a clearing turn immediately as the landing gear is retracting. As the jet got to the end of the deck, I’m slapping the gear up, just as the engine dies. I didn’t do a clearing turn on purpose. I didn’t know what was going to happen, so I got clean and set a 10°, nose up attitude to allow the jet to slide first before doing a clearing turn. As soon as the weight came off the wheels, the ramp went down, the engine sucked out, the nose of the jet came around to the right and we were looking at the side of the ship as we flew out past the bow. The yaw was pretty impressive, but the aircraft flew fine, and I don’t think we got too close to the water. I got it under control and flew it back up.

“It was a scary moment, and we were carrying a TARPS pod to do some reconnaissance over the Strait of Hormuz during Operation Nimble Archer. We might have made it into the Persian Gulf, but the ship didn’t want me to continue with the mission with what might have been a bad engine.”

Vietnamese Encounter

On August 14, 1987, Jon was the pilot of an F-14 sat on catapult three on the USS *Ranger* off the coast of Vietnam ready to launch. His squadron skipper was in the back seat. Two MiG-23 Floggers had taken off from Cam Ranh Bay, Vietnam and were inbound to the area of the *Ranger*.

Jon explained: “As we launched, the Floggers split. One went north to check on a P-3 Orion on patrol off the coast of Vietnam, the other was tracking toward the ship. Our wingman headed north, and we took the MiG coming towards the ship.

“As we engaged him, we get into an oblique rolling scissor to get the advantage on him. The MiG-23 pilot then levelled out and immediately headed back to base.” Jon thought the pilot was trying to drag the Tomcat inside the 12-mile limit.

Closing on the 12-mile limit, Jon turned to the south, to remain parallel with the exclusion line with an eye kept on the bogie MiG to make sure the pilot did not make a turn and take a pop at the Tomcat. With a four-mile separation the bogie MiG turned back toward the Tomcat. Jon came back around on the bogie repeating the manoeuvre three times. Eventually, the MiG pilot levelled out giving Jon the chance to join on the wing, for a second or two. The MiG pilot did everything he could to keep the Tomcat from joining but Jon managed to get close enough to see the pilot who then turned into the Tomcat before levelling off and returning back to his base.

It was the first time a Soviet MiG-23K had been seen operating from Vietnam and Jon is certain the pilot was not Vietnamese. Using the Tactical Camera System, Jon’s RIO captured good imagery of the Soviet pilot trying to prevent the Tomcat joining on the wing. According to Jon the video showed the Soviet pilot cycling in and out of afterburner and his speed brakes.

The other Tomcat had captured images taken from overhead the bogie MiG showing, in plan form, notches in the slats which identified the aircraft as a MiG-23 Flogger-K.

A head-on view of an F-14A Tomcat of VF-2 during a mission flown from the USS *Ranger* (CV 61). US National Archive/US Navy/Lt Cdr Baranek

Yacht Gunner

Serving two tours in the Navy's most famous fighter squadron was **Rob Reed's** reward for a job well done in flight school.

In 1997, Rob Reed left the active-duty Navy after ten years of flying F-14 Tomcats. He had served two fleet tours with Fighter Squadron 84 (VF-84) 'Jolly Rogers' and Carrier Air Wing 8, and two instructor stints with VF-101, all at Oceana. Chalking up 1,900 hours and just under 400 carrier landings, Rob considers himself an all-out Tomcat man. That's not surprising given that he finished near the top of his flight school class. He got his first choices, the F-14, and the east coast.

Rob described the change from flying the A-4 Skyhawk, a single-engine subsonic jet without hydraulics, to flying the F-14, a two-engine, afterburning monster with variable intakes and variable geometry wings, as enormous. He compared it to driving a tractor then switching to a Corvette Stingray.

His first impression of the Tomcat was from the backseat of an A-4 when he got a flight while deployed to Naval Air Station Key West, Florida for a few weeks, working an administrative job. He was stunned at how big the F-14 was.

Rob's first Tomcat flight was with an instructor pilot in the back seat with the standard set of radar system controls, and no flight controls or throttles.

Rob knew how to handle the aircraft systems. He had completed ten simulator rides each lasting about two hours involving every possible malfunction, emergency, and normal procedure. He felt well prepared for his first flight and remembers the excitement.

Recalling the mission, Rob said the aircraft handled well and was a joy to fly.

The syllabus objective was to work through different handling regimes, mild aerobatics, loops, fast runs with the

A Fighter Squadron 84 (VF-84) F-14A Tomcat lands on USS *Theodore Roosevelt* (CVN 71) underway in the Adriatic Sea during Operation Deny Flight. US National Archive/US Navy/PH1 Thomas Hensley afterburner engaged so the nugget pilot could feel how the aircraft accelerated in swept wing configuration, and good familiarisation for the run-in to break for landing.

For practical and tactical reasons, the aircraft's variable geometry wings were set on automatic. As the aircraft accelerated or decelerated, the wings moved to their correct position automatically. Manually setting the wing's position was only done for pattern entry selecting a forward sweep to help to decelerate quickly.

Rob maintains that when it's at the heart of its flight envelope, in the centre of altitude and speed, the Tomcat was quite docile with very good handling. However, when flying at the edge of the envelope, high altitude and low speed or very high speed, with the wings swept back, it became a very different aircraft. Rob said: "At that point, the aircraft ceased to have spoilers to augment roll control. In swept wing configuration at higher speed, the inertial moment in a roll changed dramatically, though the differential tails were more than sufficient to roll the aircraft. With the wings swept back, the aircraft became very roll-responsive at high speed, something not there at low speed. Additionally, the centre of pressure moved further from the centre of gravity to generate a greater nose-down moment over the aircraft, which meant the pilot had to compensate with nose-up trim."

The F-14A was hugely challenging to land on a ship. With the landing gear and flaps down, it had poor directional stability and poor roll response.

There was also a considerable amount of adverse yaw caused by spoiler and differential tail interaction. When the pilot made a correction for line-up, for example pushing the stick to the right, the nose would hunt to the left, coupled with poor engine response in the case of the TF30, a big, heavy Tomcat presented quite a challenge to a student pilot.

For a carrier landing, the real concern was the hook path. The tip of the tail hook should fly precisely the same path regardless of the aircraft's size to engage the three wire.

To compensate for the difference in hook-to-eye value, the lens was rolled about a vertical axis so the 3.5° incidence between the light plane and the landing area changed based on the hook-to-eye value of the aircraft; 19.8ft for a Tomcat.

Because of its size, the Tomcat had an extreme roll angle. If the aircraft were off centre line because the pilot's visual reference plane was no longer horizontal, it was canted at several degrees and could not be relied on for accurate glide slope information. The aircraft had to be on the centre line to get accurate glide slope information.

Shooting Off the Cat

Rob tended to look down at the engine gauges to make sure they were still running during the catapult stroke, because of the lack of reliability of the TF30 engines. At night he was fixated on both the engines and the attitude gyro. There was no visible horizon, therefore no indication of attitude when shooting off the end in a dark night.

A Jolly Roger Tomcat loaded with live AIM-7 Sparrow and AIM-9L Sidewinder missiles on a mission flown from the USS *John F Kennedy* in August 1986. US National Archive/US Navy/PH1 Ronald Beno

Another Jolly Roger Tomcat painted in a two-tone grey tactical paint scheme. This photograph, taken in August 1989 clearly shows the forward retraction cycle of the nose and main landing gears. US National Archive/US Navy Reserve/PH2 Bruce Trombecky

> **"Trying to guide their systems optically was futile since the Tomcat was flying so fast that optical guidance did not work."**

At night, Rob always pointed his survival flashlight at the standby gyro. It was mechanical and would work in the event of electrical failure and would enable him to still set the normal 10° fly away attitude.

Use of reheat was dependent on both the aircraft's weight and the air temperature. As a rule of thumb, if the aircraft was at or below landing weight, middle power was required. If the aircraft was loaded for a mission, typically 65,000 to 68,000lb, full reheat was required.

With or without reheat, acceleration on take-off came from the catapult not the engines with the difference felt off the end.

But reheat was only required for the cat shot in an F-14A, the F-14B and F-14D had enough single-engine fly away thrust generated by their GE F110 engines that reheat was not required. Advantageous given an F-14A in afterburner used 1,000lb of fuel per minute per engine. Thirsty consumption on an aircraft holding 16,000lb of internal fuel.

Desert Storm Experiences

On one mission flown in Desert Storm, Rob and his wingman, Bill Sizemore were returning from a combat air patrol over Baghdad, when they were asked if they had any 20mm rounds on their jets. If so, could they engage a surface target?

Rob confirmed he was able to engage on the target which turned out to be a 60ft long yacht. The Iraqis were using the yacht to run supplies along the waterway between Kuwait City and the island of Failaka.

The yacht was sailing eastbound, so Bill and Rob rolled in heading north and shot from a perpendicular bearing to the yacht. A tactic to minimise exposure to land-based threats. Bill rolled in, engaged, and emptied his gun on the first pass. He missed. Rob strafed 100 rounds. His rounds also missed, landing right behind the target. On Rob's second pass the rounds walked right up to the yacht but still no hit. On his third pass, Iraqi gunners had figured out where Rob would come from and fired at his jet. Rob tried to strafe while jinking around to avoid getting shot. With this gun empty and his aircraft intact, Rob set up for one last shot. He tried to get a radar lock on the yacht. This a tactic to shoot an AIM-9 Sidewinder missile. Ultimately, that was also unsuccessful. It was a courageous attack on Rob's behalf. He received a Medal of Valour for his repeated attempts to gun the yacht but went hungry based on his mission effectiveness!

Rob also flew many reconnaissance missions with the TARPS pod. He said: "The things that made the Tomcat a good camera platform also made it a good target, so we stayed out of the worst of the engagement envelopes of the Iraqi surface-to-air weapons.

"In afterburner, the Tomcat was supersonic in seconds. Audibly, anyone at the target did not know the aircraft was coming until it had passed. At this stage of the war,

In April 1986, VF-84 was operating this tactical paint scheme CAG-bird featuring the forward fuselage band, USS *Nimitz* titles, VF-84 and CAG-8 titles on the fin and the world-famous skull and cross bones. The aircraft is seen on an air wing detachment to Naval Air Station Fallon, Nevada.
US National Archive/US Navy Reserve/Michael Grove

most of the Iraqi surface-to-air missile batteries were not cueing with radar to avoid being struck by a HARM missile. Trying to guide their systems optically was futile since the Tomcat was flying so fast that optical guidance did not work. Speed made the Tomcat a great aircraft for the TARPS mission."

Missile Shoot

During a squadron detachment to Naval Air Station Roosevelt Roads in Puerto Rico, Rob shot an AIM-54 Phoenix on the Atlantic Fleet Weapons Training Facility.

Flying at 10,000ft, he launched the missile at a target drone manoeuvring in chaff at 500ft. It was an active shot. The missile came off a forward belly station and used its own radar acquisition and guidance.

The engagement range was close enough that the AIM-54's missile rocket motor was ignited and burning for its entire flight.

Fitted with a telemetry package in place of a warhead, the Phoenix got to within five feet of killing the drone. An impressive autonomous missile acquisition given the drone was manoeuvring at 500 feet in chaff.

To prove Rob and his RIO had not used an active radar lock using the aircraft's radar to guide the missile all the way to the drone, as soon as the missile launched, Rob made a 90° left turn to deliberately break the AWG-9's lock. He then rolled the aircraft back to the right to watch. Despite the shroud of chaff around the drone, the Phoenix had no problem discriminating the target.

But the AIM-54 got a bad reputation for reliability largely because of improper arming. Air wings used non-Tomcat ordnance men to load the missiles. Sometimes the launch pin was not correctly snapped in position, so the missile was not loaded properly. When the pilot squeezed the trigger, the missile was ejected off the aircraft, but its logic failed because of improper arming.

Tomcat Brilliance

Rob reckons the brilliance of the Tomcat was how Grumman met the Navy's set of requirements; carry 7,500lb of ordnance, accelerate to Mach 2, fly 500 miles from the carrier, stay on a CAP station, and come back to land on board no faster than 135 knots. He said: "No aircraft before or since can do all of that. The Tomcat could. The engineering and thought that went into the aircraft was incredible. In the hands of a good pilot, the aircraft was unbeatable. But the F-14B was the best in terms of airframe performance. It had slightly more drag caused by the extra sensors, but those sensors made it a better aircraft. The F110 engines were completely reliable, the pilot could slam the throttles and the engines always responded. It was the apex of the Tomcat."

In 1990, VF-84 had an all-colour CAG-bird featuring some of the squadron's details. F-14A BuNo 162688/AJ200 is seen on take-off from Oceana, Virginia.
US National Archive/US Navy Reserve/PH2 Bruce Trombecky

Shooter

A master jet base, carriers and the Tomcat production facility were all workplaces for one eager Naval flight officer.

After a three-year tour with Fighter Squadron 14 (VF-14) 'Top Hatters', Bill Paisley received orders to join a Navy team based with Grumman at its Calverton facility on Long Island, New York.

Bill was assigned to the flight acceptance team. As a US Navy RIO, he flew brand new Tomcat aircraft on acceptance flights. Those flights involved a series of manoeuvres to check all systems were functioning correctly.

Grumman test pilots always flew a new aircraft first, twice if it needed a re-fly. At this point the aircraft remained the property of Grumman so when Bill and his colleagues flew the jet the Tomcat had not been formally accepted or paid for by the US Navy.

Consequently, the Navy flight acceptance team was restricted in terms of what its flight crews could do. Both the pilot and the RIO had 15 to 20-page check lists to work through during a flight acceptance profile. In the case of an F-14D Bill said: "We took off, cycled the gear and climbed to 50,000 feet. We then flew a high-speed run at about Mach 1.2, and flew inverted to make sure there was nothing loose in the cockpit. As the RIO, Bill worked through basic radar functions and modes to ensure functionality."

Fighter Squadron 14 (VF-14) F-14A Tomcat BuNo 162701/AC100 on the flight line at Naval Air Station, Fallon in March 1988 during an air wing detachment. US National Archive/US Navy/Michael Grove

In the event that an aircraft had faults, Grumman fixed them during a 15-day re-fly order, within which Bill's team flew the jet one more time to ensure it was fit for purpose and acceptable to the US Navy. If the aircraft was not re-flown by a Navy crew within the 15 days, it had to be flown again anyhow.

Post-flight, if everything was good on the aircraft the flight crew wrote up the Material Inspection and Receiving Report (DD Form 250) which transferred the aircraft to a Navy asset. Bill and a pilot then delivered the aircraft to its assigned base.

Reminiscing about his time at Calverton, Bill said that once in a while he and his pilot would find out the schedule of Concorde departing John F Kennedy for London. When flying a functional check flight in Whiskey 72, the assigned warning area to the south of Long Island, Bill could lock Concorde up with the radar, and watch its airspeed increase as it reached high-speed flight.

Cost Base

When Leroy Grumman established his aircraft company in the 1920s, his choice to build facilities at Bethpage, Long Island was not advantageous in the long-term. Cost was a big deal. Bethpage and Calverton are located on Long Island which is an expensive area of the United States. Cost of living and taxes levied by the State of New York are high.

Grumman's manufacturing cost base reflected these conditions and impacted on its aircraft programmes. The Tomcat was a very advanced aircraft of its time and turned out to be very expensive too. Germany, Canada, and Japan were three nations that showed interest in procuring the jet but were unable to afford it. Iran, Grumman's only foreign Tomcat customer could afford the ticket price because of its oil wealth.

Despite its high-ticket price, once thing is unquestionable, pilots and RIOs rate the aircraft very highly, none more so than the final variant, the F-14D.

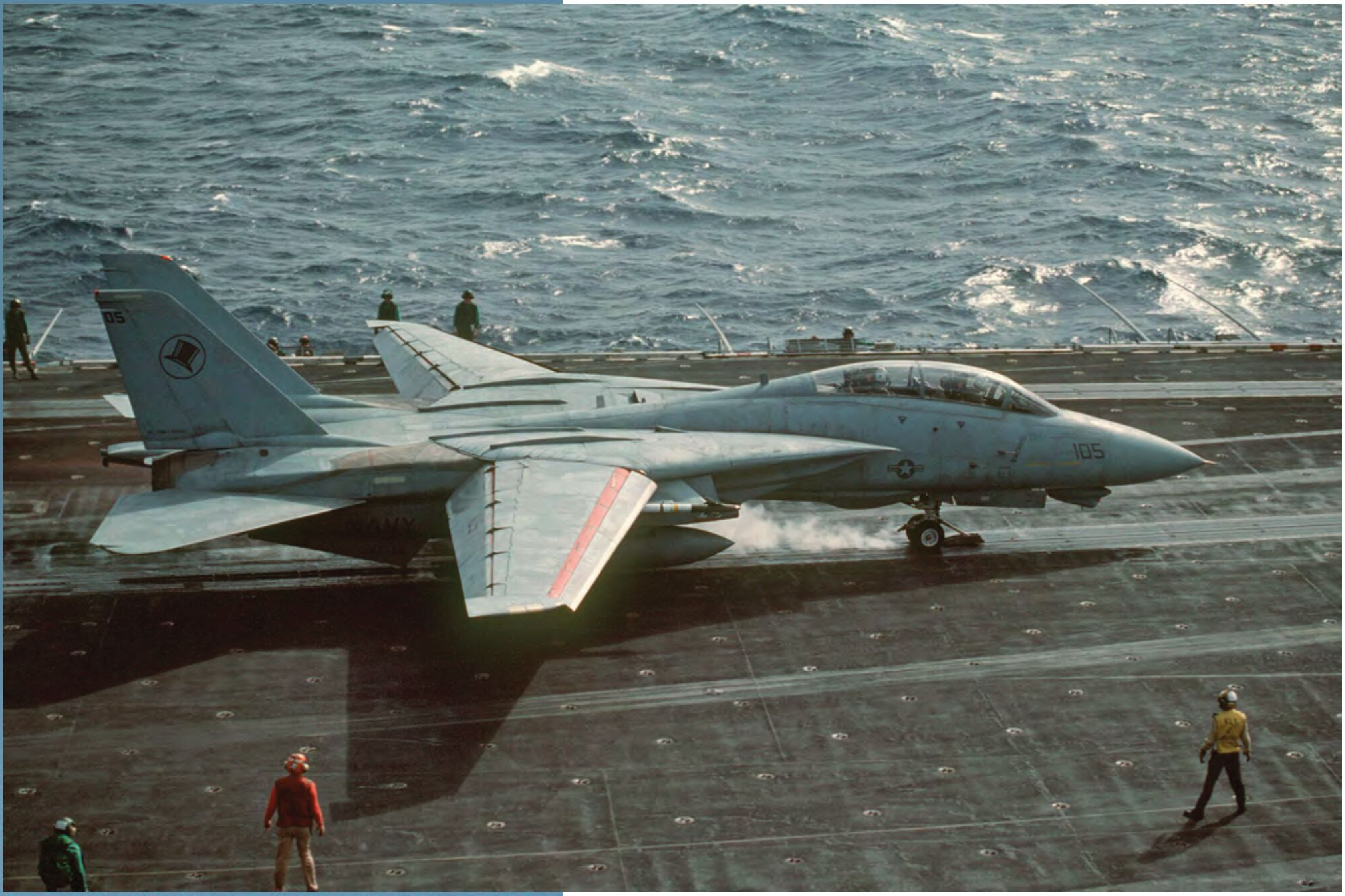
It was a significant upgrade which featured GE F110-GE-400 engines, an APG-71 radar and a MIL-STD-1553 data bus to enable carriage of most weapons in the US inventory.

Bill gave an interesting aspect of the new F110 engine: "One of the things you learned in the F-14A, powered by Pratt & Whitney TF30 engines, was the operating limitation during air combat; you did not touch the throttle at all. If the pilot adjusted the throttles while the aircraft was inverted or had slowed down, he was risking a compressor stall. With GE F110 engines you could be at zero air speed or inverted, and go from full afterburner to idle anytime, and never had to worry about a compressor stall."

Discussing air combat, Bill said: "If you needed to go slow during a fight then you needed to go slow, and when you needed to get energy back, you wanted the ability to get energy back as quickly as possible. F110 engines enabled the aircraft to accelerate from 100 knots up to 500 knots."

In August 1989, Fighter Squadron 14 (VF-14) operated a full-colour CAG-bird, F-14A Tomcat BuNo 162692/AC101 seen at Oceana. US National Archive/ US Navy/PH2 Bruce Trombecky

> "F110 engines enabled the aircraft to accelerate from 100 knots up to 500 knots."



A Top Hatter F-14A Tomcat on launch from the waist catapult of USS *John F Kennedy* in December 1986. US National Archive/US Navy/PH1 Phil Wiggins

Bill explained why F-14s powered by F110 engines launched without afterburner: “First, increased heat generated by the F110 engines at full afterburner would have warped the steel on the jet blast deflectors. Two, if the aircraft launched with afterburners it could accelerate so quickly and beyond 190 knots before the gear could be retracted. Airspeeds higher than 190 knots played havoc with hydraulic lines and other parts of the landing gears.”

When Bill arrived at Calverton in 1992, the Navy had decided to chop the F-14. But 37 brand new F-14Ds had been paid for, and another group of airframes were funded for upgrade to F-14D standard.

Bill explained how the Navy trained for a war time scenario in which the Soviets would sortie its Northern fleet through the Greenland, Iceland, UK (GIUK) gap. Navy carriers would deploy to the region and F-14 Tomcats would provide protection from Soviet long-range bombers like the Tu-16 Badger, Tu-22 Backfire and Tu-95 Bear, in the fleet air defence.

The Tomcat-Phoenix combination was designed to counter the bomber threat from CAP positions 100 miles out in front of the fleet, with the AIM-54 Phoenix missile adding another 175 to 200-mile range, preventing their transit through the GIUK.

With the dissolution of the Soviet Union, the scenario was no longer relevant, and the original Tomcat role was lost. Consequently, the US government and the Navy decided they no longer needed 500 brand new F-14Ds, not even the 37 already paid for, and opted to equip the fleet with the F/A-18 Hornet series of strike fighters.

It’s ironic, but unsurprising, that the F-14D turned into a fantastic strike fighter, as opposed to the traditional fighter. In Bill’s opinion better than the single-seat F/A-18E and two-seat F/A-18F Super Hornets. All thanks to the integration of the LANTIRN laser designation pod and its data bus, which gave the jet a precision-guided air-to-ground capability.

“We could bang four jets off the deck in about 45 seconds.”

Nineteen F-14 Tomcats assigned to Fighter Squadron 31 (VF-31) ‘Tomcatters’ and Fighter Squadron 213 (VF-213) ‘Black Lions’ in formation over Naval Air Station Oceana, Virginia on March 10, 2006. This was just six months before the type’s retirement. US National Archive/US Navy/PH2 Steven King

At the end of its career it was conducting strike missions, forward air control, close air support in addition to its original fighter role.

At the end of the Tomcat’s service career, one of the biggest hits on the F-14A model was the intensity of the maintenance manpower requirement to keep them mission ready given the age of their systems from the 1960s and 1970s. By comparison, brand new F-14Ds equipped with the latest technology did not have heavy maintenance manpower footprints. Had the government and Navy stuck with its original decision to replace F-14As with F-14Ds, from a capability perspective the Navy would not have lost any performance or capability compared with its current fighter fleet.

Catapult Officer

Between 1996 and 1998, Bill served as a catapult officer with the USS *Eisenhower’s* (CVN 69) Air Department. A time when Carrier Air Wing 3 had just one F-14 squadron (VF-32) assigned. Bill reckons it was advantageous as a catapult officer to have a cockpit perspective knowing what the pilots were thinking about during their hook-up and launch procedures. Some of his Air Department colleagues at the time were from other communities such as the P-3 Orion doing a ship tour.

A catapult officer held a great deal of responsibility. Bill said: “Out of the 5,000 people on board the ship, when you took charge of the flight deck, the catapult and launches, there was no greater responsibility that anybody had. There are four catapults and two catapult officers, one on the bow and one at the waist. My job was to coordinate with both. We could bang four jets off the deck in about 45 seconds. The catapults were re-loaded with aircraft, and the launches continued. Responsibility was incredible.

Tomcats were always first to launch and flew a 75-minute cycle, Hornets 45 minutes.

There were two ways to launch aircraft on the *Eisenhower*. The traditional way involved standing on deck at 45° from the aircraft using a two-finger launch signal to the pilot. Or use the integrated catapult control system dubbed the bubble.

Bill and his colleagues preferred being on deck, being in the mix looking at the wind indicators to ensure there was sufficient wind over the deck for each launch, watching the deck edge and the catapult operator on the catwalk. Bill said if he couldn’t be in the cockpit, launching was the next most exciting thing.

Prior to launch, aircrew brought a chit to the flight deck. It listed their aircraft side number, total weight, and an afterburner instruction. Air Department personnel collected the chits and used a book containing charts for matching wind over deck with the aircraft weight to determine the required catapult setting.

Catapult crews undertook about an hour and a half of pre-operational checks before any launches were allowed, and at the end of the flight day, a couple of hours of post-operational checks. The catapult is an engineering system that cannot have an occasional failure. An incredible amount of work went into their maintenance. The catapult officer held responsibility for signing off the system as being ready, to the air boss. A lot of responsibility.

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